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Advertisers' Index, page 222. Contents, page 89. "Where-to-Buy," page 154. Engineering Directory, page 202. Employment, page 212. Opportunities, page 214. Second Hand Machinery, page 215. Fill-in and Contract Work, page 220.

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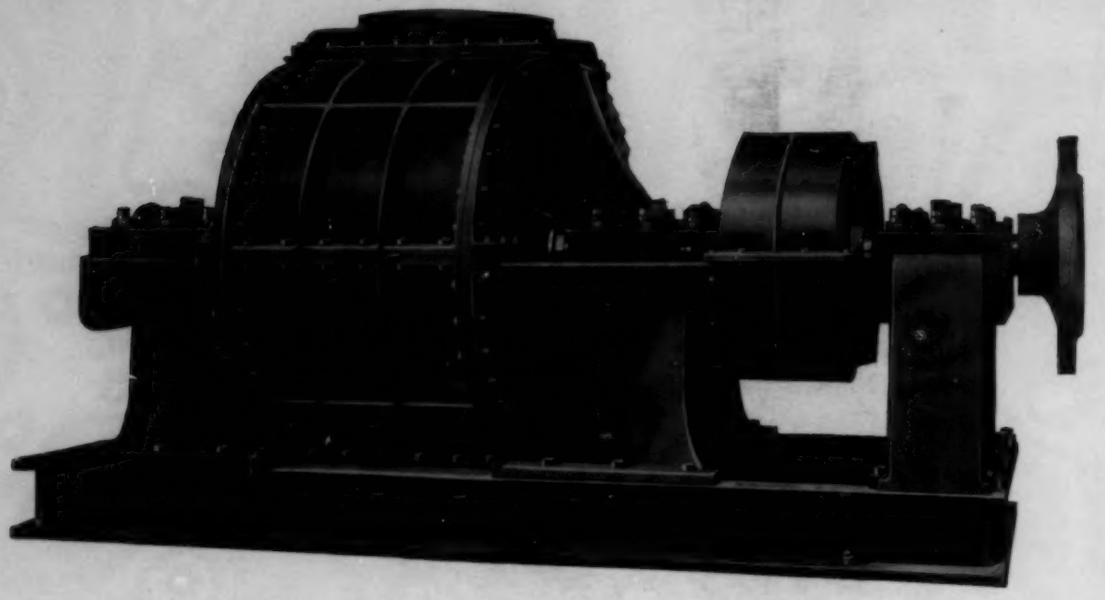

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THE IRON TRADE REVIEW

Vol. LX Cleveland, May 3, 1917 No. 18

Nation's Needs Supplied Quickly

System of Purchase and Distribution of Steel for Government's Military Purposes Now in Full Swing—Entente Powers Seeking More Tonnage and Immediate Shipment—Market Yields to War Influences

PRACTICAL mobilization of the steel industry on a war footing has been accomplished through the putting in working trim of measures of complete co-operation between the manufacturers and the government. Machinery for the purchase and distribution of essential supplies now has been fully provided and is running smoothly. Enlarged facilities are being established or recruited rapidly under federal direction for working up raw material into heavy ordnance, shells and other instrumentalities of battle on a new scale of magnitude for this country. Historic conferences at Washington among representatives of the great allied powers will determine the question how far manufacturers will be called upon to furnish preferred deliveries of finished munitions, of munition steel and of other products, to England and France especially. This decision will be of much importance to the steel industry and to the market because of the tonnage involved. Large additions to business now booked for the entente nations are up for settlement. England is a prospective buyer of 100 steel vessels to be constructed immediately in American yards.

Government as Buyer

The government continues to buy steel freely. The first order of size to be closed under the agreed price schedule is 7,000 tons of structural to the Illinois Steel Co. Further lots of sheets have been placed. Tentative tonnages of munition steel are pending. Large structural requirements continue to be framed. Total direct federal war needs now are estimated from 600,000 to 1,000,000 tons or 2 to 3 per cent of total finished output. Government requirements continue to put the clamp on new selling of steel products for ordinary use. Producers are following policies calculated to put them in a position to meet not only such requirements as have been indicated definitely, but such as may be brought forth by later exigencies. Future ingot tonnage is being freed for any application that may be demanded, through declination of the mills to sell further, where normal needs of consumers are covered for several months by previously-dated orders or contracts yet to be shipped. Some makers are unwilling to accept any new obligations whatever from the private trade until such time as it is certain the government is fully provided for.

There are some new high prices in finished steel lines still to be recorded, however. Tubular goods have been jumped $12 per ton, the largest single advance in many years. Light rails are $5 higher. Domestic users have paid $90, mill, for open hearth sheet bars. Warehouse rises are being maintained as stocks are being depleted.

Record Rise in Iron

Progression in price of pig iron during April is emphasized by the advance of $4.90 and $5.45 respectively in the monthly valley bessemer and basic averages. These are the largest advances for a single month to be shown in many years. The factors of abnormally high prices, far extended deliveries on new purchases and renewed doubt over coal and coke supplies and costs are producing greater caution in both the buying and selling of iron, to which conservative interests are lending their support. New business for 1918 consequently has subsided somewhat. The scarcity of iron for this year has resulted in further upbidding of prices and in forcing buyers to reach out far beyond their accustomed zones of supply. Two basic users in Cincinnati territory are figuring for 15,000 to 20,000 tons each for delivery running through the first half of next year. A Canton, O., steelmaker wants 10,000 tons of basic for last quarter and first quarter. A 7,000 basic sale was made in northern Ohio. Eastern low phosphorus has continued active. Actual sales of charcoal iron for this year have brought $50, furnace. Bessemer is selling above $44, valley. Deliveries of iron to consumers engaged in war business are being expedited on request.

April with an ouput of 3,319,809 tons was the record largest month in daily production in the history of the pig iron industry. The gain over March was 63,996 tons.

Government Tool Buying Deliberate

War Department's Requirements to be Heavy—Some Purchases Have Been Made —Ship Yards Come in for Many Machines—Railroads Balk at High Prices While Tools Advance Again

APRIL was mostly a period of waiting among leading machinery builders, pending decision of the government as to its requirements for munition making, but toward the close of the month numerous orders were placed. Among these was a contract for gun-making machinery for the Bethlehem Steel Co., while many smaller companies, receiving war contracts, also bought tools. Bids also were taken on navy department, coast defense, and arsenal work. However, the government purchases have just commenced; if all the buying is done that is contemplated, it is hard to say how private buyers will fare. Government work, of course, is receiving preference over all commercial business and Washington is sending out many instructions to rush deliveries of equipment to various plants working on government orders. Builders are booked many months ahead, and these rush orders are causing shipments to private users to fall further and further behind. While few large lists of machine tools for commercial work came to the attention of builders in April the number of miscellaneous orders and inquiries for a few tools was large. Coal mine operators and chemical works actively negotiated for equipment, while locomotive and car builders issued several inquiries for few tools each.

Ship Yards Buy Heavily

Ship builders have continued to be an active factor in the machinery market. The Newport News Ship Building & Dry Dock Co., Newport News, Va., bought 57 electric hoists and issued an inquiry for 10 cranes of special construction for two new ship ways which it will build in connection with its contract for two battle cruisers. Newport News also entered the market for miscellaneous tools, including an 18-inch threading and cutting machine; one 1,000-pound drop hammer; one 1,000-pound and one 1,500-pound steam drop hammer; one 24-inch double-gear planer; one 36-inch open-side planer. The Fore River Ship Building Co.; Fore River, Mass., which is constructing one new ship way, closed for five cranes of special construction. The Delta Ship Building Co., Wilmington, Del., issued a list of general ship building equipment. The Palmer Ship Building Co., Noank, Conn., plans an extension to its yard. The Baltimore Dry Dock & Ship Building Co., Baltimore, plans to expend about $3,000,000 in extensions and improvements to its yard. A great many builders are negotiating for equipment, although some of this buying is being held in abeyance while various companies are arranging their financing in preparation for future buying.

Railroads Fail to Cause Furor

The volume of railroad buying of equipment has been extremely light, due to the high prices prevailing. Westinghouse, Church, Kerr & Co. closed for two 15-ton and one 10-ton cranes for the Buffalo, Rochester & Pittsburgh railroad. The Lehigh Valley railroad closed for a smaller list of general machine shop tools. The Santa Fe railroad issued a small list, including a punch and shear, 36-inch lathes and a cotter-pin drilling machine; this road expressed willingness to accept bids on second-hand equipment. The New York, New Haven & Hartford railroad issued an inquiry for six locomotive cranes, 20 to 25 tons. The Delaware, Lackawanna & Western and Pennsylvania railroads each purchased a few machine each.

Lack of Bottoms Curtails Foreign Buying

Export inquiry has been active, but lack of bottoms has prevented this business from becoming much of a factor in the market. France is the heaviest buyer, while South American companies have been writing to builders for catalogs, and showing a generally increased interest in American machine tools. Among the most important of the French inquiries was one for 35 cranes for coal handling and other similar harbor work.

Conveying equipment builders have experienced an active month, while the entrance of the government into the market increased the congestion of orders. In most cases builders of cranes are booked fully six months ahead. The navy department distributed several orders for locomotive cranes, among them 13 for the Brooklyn yard. The Crucible Steel Co. awarded a contract for six electric traveling cranes to the Pawling & Harnischfeger Co., Milwaukee. The General Electric Co. closed for 15 electric traveling cranes for its Schenectady plant. The government's crane requirements have not yet been outlined, but it is believed several hundred locomotive cranes will be required in the next few months.

Price Advance Continues

Several builders announced an increase of 10 per cent in both drilling machines and milling machines the latter part of April. The price advance in practically all lines of machine tools and conveying equipment has been uninterrupted. At present radial drills are quoted by several leading builders between 90 and 100 per cent higher than two years ago; shapers, 40 to 50 per cent higher; upright drills, 50 to 60 per cent higher. Despite these advances, builders say there is less profit today in dollars in a machine selling at current prices, than there was two years ago, when the same tool was quoted perhaps 50 per cent lower. This condition is due to the increase in cost of materials and wages and to the reduced efficiency of labor.

The machinery tool market has been featured by many offerings of used tools by manufacturers completing contracts and sub-contracts of munitions for the allies. The most important of these was a list offered by W. L. Perkins Jr., 30 Church street, New York City, who was said to be acting for an eastern locomotive builder which has completed a large munition contract for the allies. This list included over 600 tools, many of them lathes. Although these offerings of used tools have been plentiful they have been of little importance as a factor in the machinery market under present conditions.

MEN OF MACHINERY TRADE

Who they are **Where they are** **What they are doing**

G. J. HAWKEY, formerly sales manager of the machine tool department of the Cleveland Tool & Supply Co., Cleveland, has resigned from that position to become vice president and general manager of the Cleveland Co-Operative Machinery Co., 1041 Engineers building, Cleveland. Mr. Hawkey has had a wide experience in the machinery field. Before becoming associated with the Cleveland Tool & Supply Co., he was district manager of the Chicago territory for the American Wrapping Machine Co., Portland, Ore. For two years he was employed as mechanical engineer for Zimmerman-Wells-Brown Co., machinery engineer, Portland, Ore. He was actively associated with the Vonnegut Machinery Co., Indianapolis, and for two years was Philadelphia branch manager for Hill, Clark & Co., machine tool dealers. Mr. Hawkey has had not only a varied experience in the sale of machine tools and shop equipment, but a practical experience in machine design in some of the largest tool plants in this country. Mr. Hawkey will be associated with F. A. Maxwell, president of the Cleveland Co-Operative Machinery Co. Mr. Maxwell has developed a number of machine shop accessories, including a boring tool holder of unusual design. He has a broad acquaintance with the machine tool trade not only in Cleveland, but throughout the country. The company will market a number of representative machine tools and special machine shop equipment, and will open a sales and display room as soon as suitable quarters can be secured.

R. A. Fisher, Grand Haven, Mich., formerly superintendent of the Continental Foundry & Machine Co., Fort Madison, Mich., has been appointed production manager of the Curtiss aeroplane factory at Buffalo.

John K. Lencke, formerly of Reading, Pa., has recently returned from Petrograd, Russia, to purchase large quantities of machinery for the Russian admiralty. These machine tools and shop equipment will be purchased in New York. Mr. Lencke said, in part: "The lack of adequate transportation is making it exceedingly difficult to supply the troops which are now on the front. The machinery which is being purchased in this country will be used largely in railroad stock and ship building yards."

Worcester R. Warner, president of Warner & Swasey Co., Cleveland, addressed the Electrical League of Cleveland on the subject of astronomy at a recent meeting held at the Statler hotel.

Eugene R. Seiter, who was for a number of years connected with the Cleveland Automatic Machine Co., and the Warner & Swasey Co., both of

G. J. HAWKEY

Cleveland, has joined the staff of the Foster Machine Co., Elkhart, Ind., as sales engineer.

Charles L. Allen, treasurer and general manager of the Norton Co., Worcester, Mass., has been selected to represent New England on a special committee being organized by the chamber of commerce of the United States at the request of Secretary of War Newton D. Baker and the council of national defense, to study and report on sentiment of business interests regarding the care of dependent families left by men enlisting.

Reginald L. Colton, vice president of the Arthur Colton Machine Co.; B. H. Geddis, sales manager of the Scripps-Booth Motor Co.; Herbert J. Woodall, assistant branch manager of the Ford Motor Co., who temporarily was located in Chicago; and Henry G. Moesta, sales manager of Wallace Hood & Co., all of Detroit, have reported for duty at Philadelphia as members of the naval reserve. They have been assigned to the battleship Iowa.

J. H. Gullak, manager of the technical department of the Rato Co., Moscow, Russia, is in Philadelphia, with headquarters at the chamber of commerce. Mr. Gullak intends to investigate steam and electric power plants, mill equipment, boilers, elevators, finished steel products and various kinds of machinery in order to introduce such equipment for the expansion of Russian industries after the war. Mr. Gullak will spend a large part of his time in investigating the machine tool plants in the east.

Paul E. Thomas, for the past 13 years general manager of the Kempsmith Mfg. Co., builder of milling machines and special shop tools, has been elected president of the company. As a part of Mr. Thomas' new policy, several members of the executive force have been given the opportunity to become stockholders in the corporation. Additional officers have been elected as follows: John Goetz, vice president and works manager; F. Wollaeger Jr., secretary; E. E. Leason, assistant treasurer and purchasing agent; Peter Lowe, assistant secretary and manager of sales and advertising.

Stanley A. Zweibel, Pennsylvania State Supervisor of Industrial Education, has been placed in charge of the industrial course which is being conducted cooperatively by the Bethlehem Steel Co., South Bethlehem, Pa., and the boroughs of South Bethlehem and Bethlehem, Pa. The course will be conducted in the schools of Bethlehem. The plan which has been adopted by the Bethlehem Steel Co., and the two boroughs, makes it possible for boys to complete their high school education and learn a trade at the same time. The methods used are similar to those in operation in the University of Cincinnati, where this system has been in use for several years. The boys will go to school part of each day and spend the remainder of the time in nearby industrial plants, principally the Bethlehem Steel Co. In conjunction with this course, the high schools, both of Bethlehem and South Bethlehem, are to be equipped with modern machine tools.

THE OPEN HEARTH

Getting Acquainted Finally

WASHINGTON has a healthier air today than has been possessed heretofore by that beautiful city of ugly politics. Where the business man has seen nothing but an ultramarine color there in bygone days, today he goes to the nation's capital, often by invitation of government officials, and observes streaks of resplendent silver on the horizon. It really seems that, almost unobserved, a new day has dawned. The business man and the government are really co-operating. Each is becoming better acquainted with the other. While the business man of any mental gage at all, always has thought well of the government, despite its mistakes, the government is finding that the business man is not only an excellent fellow personally, but also a decidedly useful unit of society. This delightful metamorphosis in the life of the government and that of business really is worth watching.

The cause of it all is the program of national defense. It came into effect when the government found itself compelled to beckon to the business man for his aid. Where the latter had been shunted he now is being hunted most assiduously.

Steel manufacturers are doing their share in affording the government a better insight into their integrity, their ability, and their invaluable worth to the nation. To recite the names of men in the trade who are visiting Washington in these days is almost like perusing the personnel of the American Iron and Steel Institute. A casual glance over the names of visitors to Washington who went there during the past several weeks to aid the government officials in its plans of preparedness, reveals prominent men of the trade.

Happily, a path is being beaten between the office of the business man and that of the government official at Washington. There are yet many weeds to be trodden down in this passageway, but the signs are hopeful. Once it is cleared perfectly, let it remain so.

Price Advance of Tools

MACHINE tool prices are now higher than at any time in the history of the industry. In this issue of *The Iron Trade Review* a graphically illustrated article appears, dealing with the present prices of shop equipment. In practically all machinery lines, unusual price advances have taken place during the past two years. It is interesting to draw an analogy between the price revisions in raw materials and the resulting changes which have been made in the prices of machine tools. Apparently few buyers realize that the prices for equipment are not figured chiefly from the cost of the raw material entering into its manufacture. A careful analysis of the situation usually discloses the fact that the cost of machinery castings is only a part of the final cost of the tool. Skill of labor, ingenuity in the design of plant equipment and shop management play an unseen and all-important role in the market quotation to the purchaser. It is true, however, that with practically every advance which has been made in prices of raw materials, notably pig iron, corresponding changes eventually have been made in quotations on machine tools. A few manufacturers have been protected over long periods by iron contracts. These builders have been the last to make changes due directly to raw material advances.

The tool builders of the United States have reaped great profits from war orders. It is natural that such should be the case. Here and there have been evidences of unnecessary price gouging. It is to the great credit of the machine tool builders, however, that in the hour of the country's peril, without exception they were among the first to answer the call to industrial preparedness and to give their services to the cause without thought of profit.

"For Want of a Nail—"

THE PEOPLE of the United States have been lulled into a false sense of security, as far as industrial preparedness is concerned. Unconsciously the daily press has given the impression that the resources of this country are on a solid war footing. Unfortunately, no such condition exists. While orders from European belligerents have resulted in building up well organized munitions plants, have been of tremendous value in educating manufacturers as to the production of war material, and have created a splendid industrial army of workers, there remains a wide gap that must be spanned before the nation really is industrially prepared.

It must not be forgotten that specifications for war material issued by foreign governments in connection with contracts placed in this country are not the same as those used by the United States government. In order to turn out munitions in mass, and that is the only way they can be produced if a successful war is to be fought, it is necessary to have the proper gages, jigs, dies and other special tools. This government does not possess these absolutely essential implements in any quantity. It was due to the untiring efforts of Representative John Q. Tilson, a member of the house committee on military affairs, and himself a soldier, that congress finally appropriated the money for a certain number of these special tools.

The task of making the drawings alone, to say nothing of the actual production of the tools themselves, is huge and is still under way, after more than

THE OPEN HEARTH

a year's study by government authorities and civilians. Among the latter is Frank O. Wells, president of the Greenfield Tap & Die Corporation, Greenfield, Mass., an expert on the subject. In the meantime war has broken out with Germany. What is the result? The government finds itself entirely without anything like a sufficient number of its standard Springfield rifles to equip an army such as it is planning to recruit. Not more than 750,000 Springfield rifles are on hand today, and the capacity of our arsenals, which alone are equipped to make these rifles, would be utterly inadequate to meet the demand, even if they were not occupied with other work. Consequently, this country, with its tremendous potential industrial strength, has to turn to a temporary expedient, a most serious thing in time of war.

Then again, the government may have to forego the manufacture of its excellent 9.5-inch gun. Why? because the necessary gages, jigs, dies, etc., are not on hand. Secretary of War Baker has said as much. The remedy? The Bethlehem Steel Co., and the Midvale Steel & Ordnance Co., have been told to "multiply for us, as rapidly as they could, according to the English design, the 9.3-inch and 9.5-inch guns", to quote Mr. Baker. These two plants are the only ones in this country equipped to make these English designs, and are equipped because they have the necessary special tools of British specifications.

Many other facts of vital importance are presented in an exhaustive article on this gage situation published in last week's issue of *The Iron Trade Review*. If you haven't read it, do so.

Loyalty and Labor

MR. GOMPERS has stated time and again that labor will be loyal throughout the war's exigencies. He has suggested that the council of defense request that employers and employes "shall not take advantage of the country's necessities to change existing standards". Very fine as an expression of patriotism but utopian unless the scheme is supported by well laid administrative plans. The rapidly increasing cost of living is necessarily changing the present transitory standards day by day. Government munitions contracts, which are for a definite period, make no provision for readjustment of prices in the event of increased production costs. Workmen in England could not exist on misguided sentiments of loyalty. Strikes occurred frequently during the first year of the war. So long as the markets continue to rise and the price of food is soaring, it seems advisable that the council should provide against these contingencies by including in munition contracts a provision for a joint conciliation committee to protect the manufacturer and the laborer from the dangers of iron-clad contracts and ascending prices. Is there no parallel to be found in England's experience?

Even-Handed Treatment Necessary

GOVERNMENT purchases of steel for war purposes at preferred prices have raised numerous questions, all of which have an important bearing on the general market. The average private customer, manufacturing for purely commercial uses, now occupies a subordinate position in the distribution of the products of the mills. His business, of necessity, has been placed temporarily, perhaps, in the light of the least desirable under present conditions for the reason that it may not be essential to the conduct of war. Price no longer determines whether a particular order is important or attractive. War utility is the final test. Apparently, that means not only war with respect to the needs of the United States as a belligerent, but as to the requirements also of its allies who have been obtaining a large part of their supplies in this country.

President Wilson especially has expressed a hope that none of the essential feed lines of war material to the entente powers be obstructed or shut off. Such an expression from the commander in chief of all the nation's forces, human or material, leaves no doubt as to what will be done, not only by the steelmakers, but also by the pig iron producers who have been furnishing large tonnages to European states now in battle. The word of governments now will count most in the division of the output of the plants. Individual pressure for material will cease to be of importance unless it is accompanied by the seal of national necessity.

Modern warfare extends to far back of the battle line and into so many branches of national business life, that it is difficult to say just where or how the check should be imposed in the distribution of material. It is certain, however, that a thorough and practical knowledge of manufacturing conditions should be held by or be available to those in authority who are directing this movement. Careful discrimination must be exercised if inequalities are to be avoided. All consumers should be made to feel and know that they are giving up only what a greater good for all, themselves included, dictates, and no more. Iron and steel makers likewise should be expected to protect themselves in dealing out tonnage at preferred prices or deliveries, to make certain that the government, directly or indirectly, is the beneficiary. Patriotism cannot be expected to extend beyond the end of equal and even-handed treatment.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products May 2, average for April, 1917, average for February, 1917, and average for May, 1916. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices May 2, 1917.	Average prices April, 1917.	Feb., 1917.	May, 1916.		Prices May 2, 1917.	Average prices April, 1917.	Feb., 1917.	May, 1916.
Bessemer pig iron, Pittsburgh..	$42.95	$42.20	$35.95	$21.95	Iron bars, Chicago mill.....	$3.25	$3.19	$3.00	$2.35
Basic pig iron, Pittsburgh.....	40.95	39.20	30.95	18.95	Beams, Chicago	4.19	3.79	3.38	2.69
No. 2 Fdy. pig iron, Pittsburgh	42.95	39.95	33.95	19.45	Beams, Pittsburgh	4.00	3.70	3.25	2.50
No. 2, Fdy. pig iron, Chicago..	42.00	39.25	31.25	19.00	Beams, Philadelphia	4.659	4.159	3.509	2.659
Lake Superior Charcoal, Chicago	49.25	42.25	34.50	19.75	Tank plates, Pittsburgh.....	4.50	4.50	3.75	2.75
Malleable, Chicago	42.00	39.00	31.25	19.50	Tank plates, Chicago.....	4.69	4.69	3.94	3.09
Southern No. 2, Birmingham...	38.00	35.79	24.50	15.00	Tank plates, Philadelphia.....	7.159	6.909	5.009	3.909
Southern Ohio No. 2, Ironton.	40.00	38.60	33.00	18.50	Sheets, blk., No. 28, Pittsburgh	6.50	5.75	4.56	2.92
Basic, eastern Pa.....	40.00	38.25	30.50	20.00	Sheets, blue anld., No. 10, Pitts.	6.50	5.37	4.37	3.02
No. 2X Virginia, furnace.....	40.00	38.25	29.00	18.00	Sheets, galv., No. 28, Pittsburgh	8.50	7.56	6.50	4.88
No. 2X foundry, Philadelphia...	42.50	41.50	32.00	20.50	Wire nails, Pittsburgh.....	3.50	3.20	3.00	2.50
Ferro mang., delivered.....	425.00	360.00	265.00	175.00	Connellsville fur. coke, contr...	8.00	7.25	8.00	2.60
Bessemer billets, Pittsburgh....	80.00	72.50	62.50	41.20	Connellsville fdy. coke, contr...	8.50	7.87	6.50	3.50
Bessemer sheet bars, Pittsburgh	80.00	72.50	62.50	41.20	Heavy melting steel, Pittsburgh	29.00	28.12	21.87	17.12
Open hearth sheet bars, Pitts..	81.50	72.50	62.50	41.20	Heavy melting steel, eastern Pa.	26.00	25.15	20.50	16.75
Open hearth billets, Pittsburgh.	81.50	72.50	62.50	41.20	Heavy melting steel, Chicago...	27.00	26.65	21.65	16.50
Steel bars, Pittsburgh.....	3.50	3.387	3.00	2.50	No. 1 wrought, eastern Pa.....	40.00	38.50	27.00	22.50
Steel bars, Chicago.....	3.69	3.54	3.14	2.69	No. 1 wrought, Chicago.....	30.00	29.80	24.00	16.35
Iron bars, Philadelphia.....	3.909	3.659	3.259	2.559	Rerolling rails, Chicago.....	35.00	31.88	25.63	17.25
Iron bars, Cleveland, local del'y.	3.50	3.25	3.00	2.40	Car wheels, Chicago.....	24.50	23.25	18.30	13.13

*Seaboard.

(For Additional Prices See Page 1008.)

April Iron Averages Break Record

Bessemer and Basic Advanced $4.90 and $5.45 Respectively—Buying and Selling Proceeding More Cautiously—Good Basic Tonnages Pending in Different Districts —Eastern Low Phosphorus Buyers Active—Japan Closing Freely

Pittsburgh, May 1.—A record for a single month's advance, of many years' standing, was broken in April by average valley bessemer and basic pig iron prices. Compiled by W. P. Snyder & Co., bessemer sales in April averaged $41.332 and basic $37.996, valley. Compared with averages for the preceding month, bessemer advanced $4.909 and basic $5.459. In the last 12 months, both grades have more than doubled in price. The upward movement of prices has not been arrested. A local consumer today paid above $44, valley, for 1,000 tons of bessemer. The Mesta Machine Co. has closed for 1,000 tons of bessemer. The United Alloys Steel Corporation, Canton, O., is negotiating for 10,000 tons of basic for the fourth quarter of this and the first quarter of next year. The National Transit Co., Oil City, Pa., has closed for 1,500 tons of No. 2 and No. 3 foundry for fourth quarter. Foundry and malleable irons are well pegged at $42, valley. Sellers of southern Ohio grades are asking that price for this year and $40 for first half. The Carnegie Steel Co. is operating 50 of its 59 stacks. On April 28, the company banked five furnaces, because of deferred coke shipments, but three of these again are blowing.

More Caution is Shown

Cleveland, May 1.—Efforts to eliminate speculation from either buying or selling of pig iron are more conspicuous in the local market. Uncertainty over costs, due to the precarious coal and coke market, is holding back selling, while buyers are more disposed to wait for a date closer to the period of consumption before obligating themselves on material for extended future delivery. Due to this sentiment, the market has been less active locally, though there have been fair miscellaneous purchases by Cleveland consumers. Spot No. 2 foundry has been sold in this territory as high as $44.95, Cleveland, or $44, valley basis; southern Ohio foundry at $40, furnace, or about $41.60, delivered, and several hundred tons of malleable from a distant point for spot and third quarter at about $44.50, delivered. Buyers are finding themselves unable to get all the iron desired from accustomed sources of supply and this explains their being obliged to close with distant furnaces. One Cleveland seller has been booking business at $42, furnace, for this year and $40 for first half of 1918. Some Alabama makers continue to sell rather vigorously in this and adjoining territories at $35, Birmingham, for No. 2 for the first half of 1918. One house disposed of from 8,000 to 10,000 tons within a week. Little iron is being offered for the current year. One maker is asking $40 for this year. A northern Ohio buyer placed 2,000 tons of 3 per cent and over silicon for next year at $41, delivered, or $37, Birmingham, and 1,000 tons of 2.25 and over at $39, delivered, or $35, Birmingham. A northern Ohio machinery builder took 7,000 tons of basic for delivery during the year beginning July 1, at $40, furnace.

Japan Wants Much Iron

New York, May 1.—Much of the current activity in the pig iron market is made up of demand from Japanese buyers who are in the market for large tonnages of various grades for the earliest shipment obtainable and are not hesitating to pay the

(*For complete prices see page* 1008.)

prices asked. Numerous sales of southern iron for immediate delivery have been made for shipment to Japan including one lot of 800 tons of No. 2 at $41.50, Birmingham, and another of 200 tons of No. 2 at $42, Birmingham. Japan also has taken a large tonnage of third quarter basic and is in the market for further basic and low phosphorus as well as for one lot of 30,000 tons and another of 10,000 tons of bessemer. It is understood that on a smaller lot of bessemer for Japan, a price equivalent to between $44 and $45, New York, was quoted. Inquiry for malleable iron is heavy and comprises 6,000 to 8,000 tons for a New York state consumer for first half and numerous smaller tonnages, principally from New York melters. Malleable is scarce and is quoted at $43 to $44, delivered New Jersey points, with some quotations considerably higher. A New England consumer has closed for 3,000 tons of basic for this year. Buying for an upper New York state interest has involved 10,000 to 15,000 tons of basic. Several good-sized transactions have been closed in foundry grades. A Connecticut consumer took 2,500 tons for early shipment, and another New England consumer approximately 1,000 tons of No. 2X for this year. Among new inquiries is one from a New Jersey melter for 5,000 tons of No. 2. Foundry prices are advancing and 42.50c, delivered New Jersey points for No. 2X, now is about the prevailing figure. A Lehigh valley furnace has declined business for this year at $43, furnace, for No. 2X and now is asking $45. A southern maker has advanced its minimum to $40, Birmingham, for first half. The American Locomotive Co. is about to close on about 800 tons of foundry and 200 tons of high manganese for last half delivery to its Richmond, Va., plant, and on the last half requirements of its Dunkirk, N. Y. plant. The John A. Roebling's Sons Co., Trenton, N. J., it develops, recently closed for several thousand tons of standard low phosphorus iron for the first half. A 500-ton lot of Lebanon low phosphorus for this year has been sold at $82.50, furnace.

Low Phosphorus Features

Philadelphia, April 30.—Much of the activity in the pig iron market this week again has been reflected in standard low phosphorus. Between 10,000 and 15,000 tons of this grade, mostly for shipment over the last half and first quarter, has been booked at prices equivalent to $75 to $78, delivered Philadelphia, depending on analysis. In the foundry grades, a large share of the new business has been in southern iron, of which 5,000 to 10,000 tons, mostly for shipment over third quarter, have been sold in this district. After further bookings at $32 and $33, Birmingham, for No. 2, good sized sales have been made at $35, and this figure now is minimum. Higher also has been done, including two lots for export to Japan, aggregating 1,000 to 1,500 tons, at $36.50 and $37, Birmingham, respectively, for No. 2. On Virginia iron, which is quiet, there is no change. Eastern Pennsylvania furnaces have booked a further good sized tonnage made up principally of small lots. Prices show an upward tendency and 2X iron for this year's shipment now may be quoted at $42.50, Philadelphia, although small tonnages have been sold at $42 and $43, both eastern and central Pennsylvania furnaces. Incidentally, some further business for first half has been booked at $36, central Pennsylvania furnace, for 2X. A resale tonnage of bessemer has been done at $41, valley, for nearby shipment.

Market Report Index

	Page
Weekly Market Report	957
Pig Iron	962
Ferro-Alloys	964
Nuts, Bolts and Rivets	965
Bars	965
Semi-Finished Steel	965
Sheets	966
Plates	966
Structural Shapes	967
Iron Ore	967
Merchant and Cast Iron Pipe	968
Coke	968
Warehouse	968
Monthly Pig Iron Figures	969
Scrap	970
Rails, Cars and Track Materials	972
Wire	972
Tin Plate	972
Non-Ferrous Markets	972
Coke By-Products	989
Machine Tools	998

Basic Buyers Inquire

Cincinnati, May 1.—Two users of basic iron in this territory are out for between 15,000 and 20,000 tons each, for delivery over the last half and the first half. Most of the tonnage is for next year's shipment. Inquiry for foundry iron is slow, which is attributed partly to the fact that furnaces are not encouraging buying. Prices are unchanged, but the tendency is upward. Southern No. 2 foundry for this year is quoted up to $38, Birmingham basis, and from $34 to $35 for the first half. Southern Ohio No. 2 foundry is held at $38 to $40 for next year, and $40 for this year, all Ironton basis. This includes Hamilton, O., and Ironton, O., district makes. Southern Ohio silvery iron is unchanged at the low price of $46, furnace, for 8 per cent silicon, for 1917 and the first half of 1918.

Market Bare of Iron

St. Louis, April 30.—Marked apprehension is being displayed by consumers relative to future iron supplies. Dealers are experiencing difficulties in furnishing even small tonnages, and predictions are being made on all sides of an even more stringent market through May. Activities are confined to a few scattering carlots, and the fancy prices involved in these transactions are a barometer of the urgency of the demand. All consumers are loaded down with business. Uncertainty relative to future iron supplies is causing many foundries to turn down attractive new orders. Prices continue strong, with an advancing tendency. No. 2 southern foundry is quoted up to $40, Birmingham, for last half delivery.

Prices Change Steadily

Birmingham, May 1.—Furnace companies in southern territory are accepting some business from regular customers for the last half of this year. Advances in quotations are taking place almost daily. The minimum price now is $35 for No. 2, while some shipments, in car lots, have been made, for immediate delivery, as high as $38. Special analyses or brands were shipped recently from this district at a price as high as $40. Business already booked for the first half of 1918 is fairly heavy. Car shortage and embargoes still are interfering with steady delivery. There is some relief westward. Furnaces are taking advantage of this by shipping iron due in the fall as consumers have made requests accordingly. Announcement is made that the Birmingham Trussville Iron Co., of which E. A. Shedd, Chicago, is president, and John H. Adams, Birmingham, general manager, is starting work on the rehabilitation of the Trussville furnace and of 300 bee-hive coke ovens adjacent, operations are expected to start in about three months. Plans are in view for the later construction of plants for the consumption of the iron. The city furnace of the Sloss-Sheffield Steel & Iron Co., which went out April 1 for repairs and relining has resumed.

Charcoal Sells at $50

Chicago, May 1.—Although inquiry and buying of northern foundry and malleable pig iron is slightly less than during April, enough business is being done to make an unusually

(*For complete prices see page* 1008.)

active market. Lake Superior charcoal in small lots has been sold for this year's delivery at $50, furnace. More than half the production of Chicago stacks for first half has been sold and practically nothing is available for last half. The quotation remains $42, furnace, for last half, and $38, furnace, for first half. Among inquiries now pending is one for 4,000 tons of foundry and malleable for delivery this year. A number of jobbing foundries are in the market for additional last half tonnage. Two Illinois sewing machine manufacturers want about 2,000 tons each for first half, and a Chicago machinery manufacturer 2,000 tons. Southern iron for prompt delivery, of which there is a limited tonnage coming to this market, has been sold at $35, Birmingham, but this week has been advanced to $36. This covers 2 to 2.50 per cent silicon. A recent sale of 3 per cent silicon was made at $41.50, delivered Chicago. For last half southern it is difficult to obtain quotations. For first half, $35, Birmingham, and higher is being quoted. It is estimated that some important southern makers already have contracted 20 to 30 per cent of first half production, and at present scarcely a maker is in the market. Indications are that some books may be opened shortly for first half. High silicon is being quoted at $50, delivered Chicago, for 8 per cent for last half.

Seek More English Ferro

Government Agencies May Be Exerted to Gain Metal for All Steel Makers—Sales at $450

New York, May 1.—Reports are current that the national council of defense may take up the question of ferro-manganese supply with the British authorities to urge not only heavier shipments to this country but also that this metal will be consigned to all consumers instead of to makers of steel for the allies exclusively as at present. The situation with regard to British ferro-manganese, continues complicated in view of the restrictions on shipments by the British ministry of munitions. An agent with some last quarter English tonnage to offer, has been instructed to sell only to munition makers. As this term is exceedingly indefinite, further and more detailed instructions have been requested.

While no important business was done in ferro-manganese during the week, numerous small sales were closed including 200 tons of domestic for last half at $415, delivered. Several other sales of domestic for last quarter were made by a western maker at $400, delivered. A few carloads of May domestic metal were sold at $350 and $375, delivered, but these prices now cannot be duplicated and the minimum of the market is $400, for spot. Several carloads could be had at this price. A small tonnage is reported as having been sold at $500. On last half the minimum with domestic producers appears to be $400. A limited amount of last quarter English metal could be had at less.

Spiegeleisen continues to be held at a minimum of $75, furnace, for any shipment this year. Some sellers are quoting $80, furnace, on spot, which is very scarce. An inquiry for a large tonnage for first-half shipment has not brought out any quotations. Sales of 30 to 40 per cent spiegeleisen have been made the past few days for early shipment at less than $4 a unit but the prices done now cannot be duplicated.

Several carloads of 50 per cent ferro-silicon for June and July were sold this week at $250. This is about the earliest shipment possible. Some makers are taking care of regular customers at prices near the level prevailing several months ago but have little or nothing for open sale. Business in 11 per cent ferro-silicon for June shipment has been done at $62.50, furnace.

Prices on ferro-tungsten are advancing, due to higher quotations on tungsten concentrates. Ferro-tungsten is quoted at $2 to $2.15 and this range also obtains on tungsten powder. The market is quiet. Ferro-chromium is quiet as to sales, but there is a good inquiry. The market is around 18c to 22c for 60 to 70 per cent alloy containing 4 to 6 per cent carbon.

Alloys Climb Upward

Pittsburgh, May 1.—Dealers are asking $450, delivered, for 80 per cent ferro-manganese, but no sales above $425 have been made in the open market. Talk of $500 material frequently is heard. Lower grades of bessemer ferro-silicon have been advanced $5 a ton, but no sales of consequence have been made at new prices. Spiegeleisen has been put up $5 to $80, furnace. The last sale of importance was on the basis of $75, furnace.

Chicago Ferro is Steady

Chicago, May 1.—Ferro-manganese from the Chicago stack is strong at $400, furnace, for last half and $425, furnace, for spot delivery. This alloy is scarce and at times it is not possible to help production as supplies of manganese ore are limited.

(*For complete prices see page* 1008.)

New Ore Ruling

Modifies Former Rate Decision—New District is Created

Washington, May 1.—Rates and regulations for the handling of iron ore from vessels to blast furnaces in western Pennsylvania, Ohio, West Virginia and northern Kentucky are subject to two important changes from the tentative report returned last fall according to a new decision by the interstate commerce commission. In other respects the commission confirms the separation of the present whole service charge into its components, consisting of the unloading from the vessel rail to the car, hauling from dock to switch track, and shoving the car upon the unloading trestle. The readjustment becomes effective June 1.

The important changes are the retention of Monessen and Donora, Pa., in the Pittsburgh-Wheeling district to which the rate on direct ore is 88 cents per ton for the line haul. An additional charge is provided for spotting the car on the unloading trestle. The creation of the Leetonia, O., district has been approved and that point, Dover, O., and New Castle, Pa., are taken out of the valleys district and given a rate of 55 cents for the line haul, plus 6 cents per ton for port service or 61 cents to the track leading to the furnace, against 56 cents for valley furnaces.

The tentative report generally was said to retain the rate of 56 cents on direct ore to the valleys, but this was not an accurate statement. Under the new method the rate to the valleys consisted of 6-cent unloading and 50-cent line haul charges. There is to be an additional spotting charge of from 2c to 4c per ton.

In the original report the commission expressed no opinion regarding allowances by the carriers on ore moved by them from private docks. In the final report the commission holds no allowance should be made, because only one of the private docks, that of the Pittsburgh & Conneaut Dock Co., Conneaut Harbor, O., is reached directly by a railroad, the Bessemer & Lake Erie. The railroads at present are paying these private docks 2c per ton. The private docks are not entitled to allowances, it is declared, because it is impossible for the railroads to bring ore from such docks except through industrial railroads.

In order to carry out its new scheme of stating rates on ore, the commission

found it necessary to introduce into the territory affected, violations of the long-and-short-haul rule. The Pennsylvania will be given permission to violate the long-and-short-haul rule on ore hauled from Cleveland and Ashtabula, O., to Sharon, Sharpsville, Farrell, and other points in the Shenango valley over routes passing through Leetonia or New Castle or both, and on ore to Neville Island and McKees Rocks.

Sheet Bars at $90

Closed in the Cleveland District—Billets Fail to Sell

Cleveland, May 1.—Open hearth sheet bars for delivery by July were sold this week to nearby consumers at $90, Cleveland mill, one sale of 2,000 tons having been made on this basis. This is the minimum price now quoted by an important local producer who also is asking that figure on open hearth rerolling billets.

Sheet Bars at $90

Pittsburgh, May 1.—Open hearth sheet bars for immediate delivery have been sold at $90, according to frequent reports. The general market, however, is quotable at about $80 to $82.50, mill. Billets are selling at $75 to $80. Demand for both products is heavy, especially for nearby shipment. Sheet bar makers are giving preference to tin plate manufacturers. Muck bar is held at $50 and wire rods at $85 to $90, Pittsburgh.

Cold Rolled Climbing

Pittsburgh, May 1.—Cold rolled strip steel manufacturers have scarcely any additional tonnage to offer for shipment before Aug. 1. Most mills have withdrawn prices below 7.50c, but the 7c quotation has not disappeared entirely. For prompt delivery, makers are asking 10c and 11c.

$75 Billets Unattractive

Philadelphia, April 30.—That the consuming trade in the east is not as hungry for semi-finished steel as was supposed appears to be indicated by the fact that between 500 and 1,000 tons of open hearth re-rolling billets for June and July shipment have been offered this week at $75, Pittsburgh, without attracting a buyer. At the same time, however, semi-finished steel continues difficult to buy. One interest after purchasing a round tonnage of wire rods for export at $88, New York, about two weeks ago, has found it impossible to obtain an additional 1,000 tons at this figure and now probably would have to pay no less than $90, New York

Shell Tonnage Pending

But No Large Government Purchases Have Been Made—Implement Manufacturers Seek Additional Tonnage

Pittsburgh, May 1.—Tentative inquiries are pending for heavy tonnages of material for the manufacture of shells, but bar makers say the government has not yet distributed any sizeable tonnages. The Poole Engineering & Machine Co., Baltimore, which has been awarded a contract for 1,170,000 1-pound common projectiles and 100,000 1-pound target projectiles, has not yet distributed orders for rounds, according to Pittsburgh makers. Agricultural implement manufacturers are playing a more important part in the market and many of them are attempting to buy additional tonnages for shipment this year. Steel bars are held at 3.50c.

Steel Bars Scarce

Chicago, May 1.—Under present circumstances, with the leading interest and the leading independent out of the market on steel bars, the situation is somewhat narrow. The quotation appears to be from 3.69c, Chicago, at which it is doubtful if much tonnage can be placed, to at least 4c, Chicago mill, for delivery in two or three months. Some mills are rolling steel bars from discards, which are available for many purposes, and for these 3.75c, Chicago, has been done. Hard bars continue firm at 3.50c, Chicago mill. Mills producing these are not selling as far ahead as on soft steel bars, but specifications by implement manufacturers are being received in large volume. Demand for bars for concrete reinforcement is somewhat less than is expected at this season due to present prices. Considerable work of this sort is under consideration.

Sells Third Quarter Output

Youngstown, May 1.—Sheet bars at any price are scarcely to be bought in the Mahoning valley. The only producer in the market has practically disposed of his third quarter output and has not opened his books for the last quarter. Certain tonnages must be reserved for regular consumers, and the government's requirements are awaited. Transportation difficulties, both as to incoming and outgoing shipments, while not as acute as they have been, still continue to give traffic managers much trouble.

Eastern Sales at 3.75c.

Philadelphia, April 30.—Small tonnages of steel bars have been sold here during the week at 3.75c, Pittsburgh, or 3.909c, Philadelphia, for prompt shipment. Demand is heavy, but the mills are taking on only such small tonnages as are imperatively needed and which can be taken care of without interfering with deliveries of business already on books.

Shafting at 5 Off

Pittsburgh, May 1.—Cold rolled steel shafting is being held at 5 per cent off the list by many makers. The 15 per cent off of the list price, however, has not disappeared. Rather heavy tonnages are being used for making fuses for the government. Shafting and screw stock likely will be advanced to the list price at an early date.

Hoops and Bands Scarce

Pittsburgh, May 1.—Virtually every manufacturer of hoops and bands has withdrawn from the market for shipment before the latter part of this year. Mills are quoting only upon application. Prevailing prices, adopted some time ago, are nominal.

Rivet Demand Augmented

Pittsburgh, May 1.—Naval and merchant marine programs have created a tremendous demand for ship rivets, nuts and bolts, which are being consigned to all quarters of the globe. Ship rivets are being held at 5.50c, or $15 a ton above the price of ordinary structural rivets. Manufacturers say the declaration of war by the United States has made it increasingly difficult to obtain desired tonnages of bars. The recent increase of $3 a ton in the price of steel bars presages an advance in quotations on nuts, bolts and rivets.

Bar Iron is Stronger

Chicago, May 1.—While 3.25c, Chicago mill, is still being done on attractive tonnages of wrought iron, the greater portion of tonnage now being placed is booked at 3.35c, mill. Some sales are being made as high as 3.50c, mill, mostly to consumers who are not regular customers and for tonnages which do not fit so well into rolling schedules. Sales for the remainder of this year form an excellent backlog, but there still remains considerable production not yet contracted. Sellers are not anxious to close this at present, but are considering inquiries as they come up.

(*For complete prices see page* 1008.)

Decline Ship Plates at 9c

Pressure on Eastern Mills is Undiminished—England Wants 100 Steel Vessels Built in American Yards

Philadelphia, April 30.—Large tonnages of plates continue to be offered to the mills both from foreign and domestic sources, but no business of importance has resulted, due to the sold-up condition of the makers. These interests practically have stopped taking on any new work until the unfilled tonnage on their books is considerably reduced. One maker turned down 3,500 tons of Lloyds ship plates on which 9c, Pittsburgh, was offered, 4,000 tons of plates for tank cars, 3,500 tons for structural work, etc., without even quoting a price. Demand for contract continues persistent, but the mills will not quote for specifications beyond July 1. Official quotations are unchanged from the level previously named, but the mills still are quoting ½c or more higher a pound on selected lots they decide to consider. These are few in number. Small lots of tank plates have been sold at 7.50c, Pittsburgh, and of groove rolled plates at 6c, Pittsburgh.

Mills Are Swamped

Pittsburgh, May 1.—Pittsburgh manufacturers literally are swamped with tentative inquiries for plates for constructing ships for this and foreign nations. According to frequent reports, Great Britain has completed plans for building 100 steel ships in this country, but no definite inquiries have been sent out for necessary steel tonnages. At a meeting held at New York last week, to distribute tonnages for war purposes, Pittsburgh manufacturers said they are ready to devote their entire capacities, if need be, to the government. Considerable material already has been distributed by the committee in charge of the general allotment, but details of orders sent to western Pennsylvania mills have not been announced. Plates are being held at 4.50c and above for future shipment; as high as 7c and 7.50c are quoted for nearby delivery.

Government Orders Tugs

Cleveland, May 1.—Orders for two tugs have been placed by the government with the American Ship Building Co. and will be built at Buffalo; each will require 600 tons of steel, which has been placed. A wide range in plate prices continues, recent quotations having shown a spread of $15 a ton. One eastern maker quoted 6.50c, mill for four to five weeks' shipment; another 6.75c, mill, for about the same shipment, and a third 7.50c for indefinite delivery. A local maker of medium widths is quoting 7.50c, mill, minimum, and has named as high as 8.50c.

Plate Demand Heavy

Chicago, May 1. — Inquiries for steel plates continue to flood the market and most makers are unable to entertain more than a small part of the business offered. Under present circumstances the quotation appears to range from the minimum of 4.69c, Chicago, to practically 7c, Chicago mill. Export demand is unusually strong and domestic users are also seeking to obtain further tonnage, which mills are not able to furnish. Probable needs of the government for ship building purposes are keeping producers on the alert and giving the market an air of uncertainty which will continue until their requirements are known.

Implement Sheets Sought

Manufacturers Add to Purchases to Meet New Demand for Farm Tools—Government Buying Low

Pittsburgh, May 1.—Many farm machinery manufacturers have succeeded in buying additional sheet tonnages for delivery during the second half to meet the increased demand for agricultural implements caused by the war. When leading sheet makers opened books for delivery in the second half of 1917, they allotted the implement trade about 50 per cent of its requirements. It develops that fully 50 per cent of the tonnage purchased for delivery in the first half will not be delivered until the third quarter. Several of the larger manufacturers of farm machinery, who have been in close touch with sheet producers since the United States entered the war, say they will not be embarrassed by inability to obtain material. It is too early to say how implement makers will fare in 1918, but it is believed they will experience no difficulty in obtaining sheet requirements. Several of the larger manufacturers of sheets in this district have assigned officials to take care of tonnages wanted by the government. Fairly large orders for sheets entering into the manufacture of cots, camp ranges and buoys have been distributed this week. The government continues to buy material at considerably below minimum prices for shipment to the domestic trade. Blue annealed sheets, described as extremely scarce, are selling at 6.70c and higher, or $2 a ton above the minimum price of black sheets. Coated stock is commanding as high as 9.60c for No. 28 gage for third quarter. About 42 per cent of the galvanizing capacity of independent sheet mills is engaged.

Government Buying Freely

Philadelphia, April 30.—Demand for sheets in this district is of greatly enlarged proportions, and is coming from a variety of sources, both foreign and domestic. Practically the only business being taken on, however, is comprised of requirements, either direct or indirect, of the government. The business of this character already placed is of large proportions and much additional appears to be ready for early action. The quotation on No. 10 gage blue annealed sheets for third quarter continues 6.50c, Pittsburgh, or 6.659c, Philadelphia, but this figure is largely nominal.

More Sheets to Government

Youngstown, May 1.—More government business is coming to Mahoning valley sheet makers in scattering lots, and aggregating perhaps close to 1,000 tons; it is being taken almost exclusively by one maker who is best able to supply the open hearth material required. The sheets wanted are mainly for camp equipment. Market prices are being paid.

Production is improving. Traffic conditions fluctuate from day to day. All the manufacturers report that they are still obliged to "fight for every car". It continues to be more difficult to get cars for outgoing shipments than to get shipments of raw materials and chemicals into the plants. Indisposition to take on new business has become general among the manufacturers in this district. Some are practically sold up for months ahead, and while they do not expect to be deluged with government work, yet they have no definite idea as to how much will be required of them, and they are awaiting further developments. Trading now is mainly a matter of disposing of odd accumulations, rolled from

(*For complete prices see page* 1008.)

discards such as high carbon sheets for shovels and wheelbarrows. In most cases these have been bringing a reduced figure.

One leading interest is offering a few black sheets at 7c, minimum, for No. 28, bessemer; another has some blue annealed to sell at 7c, base, for No. 10. There is practically no galvanized stock to be had at any price. Some of the last sales of coated material commanded 9.60c.

Speed Up Shape Deliveries

To Push Ahead Government Navy Yard Construction—Sellers Offering Little to Outside Trade

Pittsburgh, May 1.—Fabricators have been asked to hasten shipments to navy yards, where material is wanted for additional machine shop capacity. Although inquiries are numerous, no large structural contracts have been placed in this district recently. Several proposed structural undertakings have been postponed on account of the war. Prices are strong at 4c minimum. The government has sent out inquiries for 1,000 battery cases, structural steel for aeroplane hangars at Pensacola, Fla., and for transmission towers. Furthermore, scores of inquiries have been sent out for steel for helmets, camp ranges, etc.

4.25c Nominal in East

New York, May 1.—One maker of structural shapes still quotes his minimum as 4.25c, Pittsburgh, but this figure, which applies to distant deliveries, is entirely nominal. The prevailing level now is around 4.50c, Pittsburgh, and this is the minimum quoted by a large maker. Business is reported at higher levels including small tonnages at 5c, Pittsburgh. The mills are well sold up over the remainder of the year but have not taken much tonnage for next year.

Eastern Demand Increases

Philadelphia, April 30.—Minimum quotation on plain structural shapes in this district now appears to be 4.50c, Pittsburgh. Several small tonnages, however, have been booked at 5c, Pittsburgh, a new high record. Demand again shows an increase and now involves a large tonnage in the aggregate. The mills, however, due to their sold-up condition, continue to turn down most offerings, so that little new business is reported.

Want Little Business

Cleveland, May 1.—Eastern mills continue to name 4.50c, mill, or 4.704c, Cleveland, for structural shapes for indefinite delivery, but are indifferent to sell. Pittsburgh makers have been able to obtain without difficulty 4c, Pittsburgh, or 4.105c, Cleveland, for early shipment. One maker who sold some tonnage on this basis now is not inclined to take further business. Complete revision has been made in the plans for the new Cleveland hotel and this applies to size, general contractors and architects. About 1,600 tons of structural steel additional will be required. The fabricated material for the job originally was bought at less than $50, erected, whereas present prices range from $130 to $150 per ton. A 2,500-ton job at Akron has been placed.

Western Buying Better

Chicago, May 1.—Two tonnages larger than recently closed were placed last week in the western market. One involves 3,090 tons for two viaducts in connection with the Chicago Union Station, to the American Bridge Co., and the other tonnage, 2,085 tons, for a telephone exchange building in Kansas City, to Christopher & Simpson at St. Louis. Prices on plain material range from 4.19c to premium prices well above 5c, Chicago.

CONTRACTS AWARDED.

Addition to plant of National Malleable Castings Co., Cleveland, 600 tons to McClintic-Marshall Co.

Enlargement of plans for new Cleveland hotel from 600 to 1,000 rooms, 1,600 tons additional to American Bridge Co. Thompson-Starrett Co. received general contract under revised award.

Office building, 130 William street, New York, 800 tons, to Levering & Gerrigues.

Public library, Philadelphia, 2,500 tons to Phoenix Bridge Co.

Power house for Firestone Tire & Rubber Co., Akron, 2,500 tons to Fort Pitt Bridge Works.

Polk and Taylor streets viaducts at Chicago, Ill., for Chicago Union Station Co., 3,090 tons to American Bridge Co.

Exchange building at Kansas City, Mo., for Southwestern Bell Telephone Co., 2,085 tons, to Christopher & Simpson, St. Louis.

Steel for viaduct at Shelbyville, Ill., for Chicago & Eastern Illinois Railway Co., 298 tons, to Decatur Bridge Co.

Machine and electrical shop, Philadelphia navy yard, 1,600 tons, to McClintic-Marshall Company.

Union Smelting & Refining Co.'s plant, Newark, N. J., 500 tons, to Hedden Iron Construction Co.

Loft candy store, Broome street, New York, 400 tons, to Geo. A. Just.

Structural shop, Brooklyn navy yard, changed to concrete and awarded to Turner Construction Co.

Bridges for Pennsylvania railroad, 800 tons, to American Bridge Co.

Pier shed at Quebec, 1,500 tons, to Eastern Canada Steel & Iron Works.

Harbor shed at Halifax, 3,000 tons, to Dominion Bridge Co.

Extension to open hearth steel works, Donner Steel Co., Buffalo, 200 tons, to the McClintic-Marshall Co.

CONTRACTS PENDING.

Hangars at Pensacola, Fla., 1,000 tons, bids being taken by the bureau of yards and docks, navy department, until May 7.

Litt Bros. addition, Philadelphia, changed to concrete.

Bridges for Pennsylvania railroad, 600 tons, bids being taken.

Viaduct for Virginian railway, 1,000 tons, bids being taken.

Viaduct for Norfolk & Western railway, 1,000 tons, bids being taken.

Government Comes First

A northern Ohio contractor who recently was awarded a contract for steel sheet roofing for a United States government project was unable to obtain the necessary steel sheets in time to complete the work. A carload of this material en route to a private plant passed through his city. This was promptly confiscated by the contractor under government authority.

(For complete prices see page 1008.)

First Ore

Reaches Lower Lake Ports, But Ice Delays Fleet

Cleveland, May 1.—Navigation on the Great Lakes is opening slowly. The ice between Lake Superior and the Soo held back a large fleet that has been waiting for days, but a few boats have succeeded in breaking through. Some ore cargoes from Escanaba, Mich., have reached lower lake ports, but a few days will elapse before all the boats are in commission. The late start will prove an important factor in restricting the season's ore movement. The action of the general railroad board at Washington in ordering railroads to give preference to the coal and iron ore traffic, coupled with the higher stages of water on the lakes, will offset this delay to a certain extent.

Frank B. Richards Ill

Frank B. Richards, of M. A. Hanna & Co., Cleveland, is ill with pneumonia. He contracted the illness while on a trip a few days ago.

The McClintic-Marshall Co. has moved its New York office from 21 Park row to 50 Church street.

Rolled Pipe Rises Sharply

Independents Adopt $12 Per Ton. Advance Greatest in Years —Cast Pipe Prices Check Work

Pittsburgh, May 1.—Independent manufacturers of standard steel and iron pipe, water well casing, line pipe and oil country goods, May 1, advanced prices $12 a ton. This is the sharpest advance announced in many years; it is the second time in the last 30 days that pipe prices have been put up abruptly. Steel pipe has been advanced $30 a ton since Jan. 1, but prevailing prices are low, compared with those on several other standard commodities. The last previous change in prices was made March 31 by independent makers, and April 2 by the National Tube Co. Cards were issued on those dates providing advances of $10 a ton. Iron pipe at that time was boosted $12 and $14 a ton. The National Tube Co. likely will put up its quotations at an early date. Demand for tubular goods is heavy. Deliveries of certain sizes of seamless tubing are deferred three years. Boiler tube makers have detailed men to look after shipments of material wanted directly or indirectly by the government. The Oklahoma Natural Gas Co. is in the market for 70 miles of 4 to 12-inch steel pipe.

Cities Buy Little Pipe

Chicago, May 1.—Inquiries by cities for cast iron pipe are practically absent from the western market and new business now being booked consists of current orders from contractors taking small lots. Most of the larger cities have covered for their season's requirements, although a few yet remain to be heard from. Orders for specials from industrial concerns and cities continue to furnish excellent business. Quotations are unchanged.

Porto Rico Inquires

New York, May 1.—Private buying of cast iron pipe continues brisk. No large lots, however, are reported. Practically all this business involves small lots. No public lettings of any moment have been made during the week. The only sizeable inquiry is one for several hundred tons for Porto Rico. Prices are unchanged at $55.50, New York, for 6-inch, Class B, and $58.50, New York, for 4-inch, Class B.

Mayor John F. Ten Broeck, of Perth Amboy, N. J., presided at a recent flag-raising ceremony at the C. Pardee Steel Works. The Pardee company has deputized 40 special guards to patrol its plant.

Poor Car Supply

Without Effect on Coke Market—Prices Incline Higher

Pittsburgh, May 1.—Sellers of Connellsville coke have been unable to advance prices, despite an appreciable reduction in the car supply, which dropped almost 20 per cent to 65 per cent last week. An 80 per cent supply was reported on Saturday and Monday, and 70 per cent today. The Carnegie company was forced to bank five furnaces, on account of the retarded movement of coke. Spot 48-hour fuel continues to be offered at $7 to $7.50, ovens, with most makers asking the latter figure. Contract fuel is at $8, ovens. Foundry coke is unchanged in price. Production the week ending April 21, was 359,533 tons, compared with 373,214 tons the week before, according to the *Connellsville Courier*.

Virginia Prices Working Up

Cincinnati, April 30.—The coke market is gradually advancing. Ovens in the Wise county, Pocahontas and New River districts are not producing sufficient tonnages to meet demand either on old contracts or for prompt delivery. Pocahontas foundry coke is now quoted from $8 to $9.50, ovens.; Wise county 72-hour coke from $8 to $10, ovens; and New River foundry grades from $8.50 to $10, ovens, all for contract delivery. Prompt shipment prices range from $10 to $12, ovens. Sales are light and scattered, and are all on foundry coke.

Cannot Take Much Business

Birmingham, May 1.—Southern coke manufacturers are not in position to take on much business for the future. Some contract renewals, at advanced prices, have been made to start July 1. The make of coke in the Birmingham district is being increased steadily. Prices are very strong. Furnace coke, in small lots, is quoted as high as $8, while foundry for regular customers is from $10 to $12. Where small lots are needed for immediate delivery, $15 is asked. The battery of ovens at Trussville is being repaired and will be started up within the next 60 days. The coke will not be offered on the open market, but will be used at the nearby furnace.

Foundry Sells at $9

Philadelphia, April 30.—Prices on foundry coke for contract shipment are advancing in this district. Following sales over the year commencing July 1 at $8.50, Connellsville ovens, a large business has been done at $9 for this period. The latter is minimum, at least with some sellers. Spot furnace coke has sold at $7.75 and $7.50, according to brands, while on contract furnace coke, $8, Connellsville ovens, now is asked by some sellers.

Steady Advances

Continue in Warehouse Prices in All Territories

Chicago, May 1.—Advances of $5 to $10 per ton have been made by Chicago steel warehouses on finished products. Bars and shapes have been boosted from 4.25c and 4.75c to 4.50c and 5c, respectively. Plates have been advanced from 6c to 6.50c. Blue annealed sheets are up from 6.25c to 6.50c for No. 10 gage, black sheets from 6.50c to 7.25c for No. 28 gage and the same gage of galvanized from 8.75c to 9c.

Sheets and Shapes Up

Cleveland, May 1.—Structural shapes from store have undergone another advance of $5 a ton and now are selling at 4.75c, Cleveland. Another sharp advance in sheets, ranging from $10 to $15 per ton, has been made. No. 28 black gage is now quoted at 7.75c; No. 28 galvanized at 9c; and No. 10 blue annealed at 7c. Buyers are being limited to one carload or 20 tons of sheets for an indefinite period.

Cincinnati Advance General

Cincinnati, April 30.—A general advance has taken place on warehouse materials, effective today. Iron and steel bars are now quoted at 4.65c, plates at 7c, shapes at 5c, and blue annealed sheets No. 10 gage at 7c. No quotations are out on black and galvanized sheets, but black No. 28 gage are usually around 7c, and galvanized No. 28 at 8.50c, f. o. b. warehouse, Cincinnati. Buying is normal, but scarcity of materials from mills is keeping the warehouse situation strong.

Samuel Pear and Samuel Jacobson, iron and steel scrap dealers, have formed a partnership with headquarters in Reading, Pa.

(*For complete prices see page* 1008.)

Pig Iron Output Approaches Record

Blast Furnace Production Gains 5 Per Cent in April Bringing Average Daily Output Near to High Mark of Last Fall —More Stacks Relight

BY SETTING the second best record in the history of American pig iron production, the blast furnaces of the country in April showed conclusively their capacity for responding to the present imperative demand for pig iron. The easing of the traffic situation enabled the coke and anthracite furnaces of the country to run close to capacity

AVERAGE DAILY PRODUCTION.

	1917.	1916.	1915.	1914.	1913.
Jan.	101,930	102,319	51,323	60,624	89,929
Feb.	94,641	106,157	59,521	67,450	92,095
Mar.	105,026	107,343	66,009	75,534	89,123
Apr.	110,660	107,517	70,484	75,383	91,812
May	.....	108,535	72,747	67,646	90,865
June	.....	107,127	78,998	63,486	87,229
July	.....	103,907	82,687	63,075	82,525
Aug.	.....	103,156	89,510	64,403	81,839
Sept.	.....	106,935	94,478	62,757	83,137
Oct.	.....	113,167	100,656	57,007	81,933
Nov.	.....	110,593	101,174	50,042	74,322
Dec.	.....	102,715	103,278	48,236	63,746
Av'ge	103,212	106,610	81,022	62,934	83,980

and they turned out iron last month at the rate of nearly 40,000,000 tons a year.

The actual production of pig iron by these furnaces in April was 3,319,809 tons, against 3,255,813 tons in March, a gain of 63,996 tons. This total was exceeded in three months of 1916, each of which had one more working day. A comparison of the average daily production during the previous months shows that April takes second rank, being surpassed only in October, 1916. The average daily output of pig iron in April was 110,660 tons, against 105,026 tons in March, a gain of 5,634 tons. October, 1916, holds the record with an average daily output of 113,167 tons.

The steel works, or non-merchant furnaces, produced 2,386,892 tons during April, against 2,339,866 tons in March, a gain of 47,026 tons. These furnaces produced daily during April, 79,563 tons, against 75,480 tons in March, a gain of 4,083 tons. The production of merchant iron in April was 897,603 tons, against 883,469 tons in March, a gain of 14,134 tons. The merchant furnaces had an average daily production during April of 29,920 tons, against 28,499 tons in March, a gain of 1,421 tons.

Three merchant furnaces were blown in and five were blown out last month,—a net loss of two, while nine steel works furnaces were relighted and five were blown out, a net gain of four.

The production of spiegel in April was 13,757 tons, against 12,226 tons in March, a gain of 1,531 tons. Ferro production in April aggregated 21,557 tons, against 20,252 tons in March.

Among the merchant blast furnaces blown in during April were: Hamilton, Hanging Rock Iron Co., April 8, and one Warwick, Eastern Steel Co. The following merchant stacks were blown out: One City, Sloss-Sheffield Steel & Iron Co., April 1; one Palmerton, New Jersey Zinc Co., April 1; Cranberry, Cranberry Furnace Co., April 2; one Colebrook, Bethlehem Steel Co., April 1.

The non-merchant stacks blown in during April were: South Works E, Illinois Steel Co., April 19; the new Madeline No. 3, Inland Steel Co., April 23; the new Gary No. 4, Indiana Steel Co., April 14; Emma, American Steel & Wire Co.; Niles, and one Isabella Carnegie Steel Co.; one Paxton, Central Iron & Steel Co., April 19. The non-merchant furnaces blown out were: One Duquesne, one Carrie and two Edgar Thomson, Carnegie Steel Co.

Elected to Waiting List

Names of iron and steel men recently elected to the waiting list of members in the American Iron and Steel Institute are:

E. Austin Barnes, mechanical engineer, Semet-Solvay Co., Syracuse, N. Y.; Eugene A. King, mechanical engineer, Semet-Solvay Co., Syracuse, N. Y.; Fred R. Drake, vice president, the Thomas Iron Co., Easton, Pa.; Charles V. McIntire, chief engineer, Otto Coking Co., 6 Church street, New York; John Woodman Higgins, president and treasurer, Worcester Pressed Steel Co., Worcester, Mass.; Frank B. Baird, president, the Buffalo Union Furnace Co., Buffalo, N. Y.; Charles Augustus Collins, second vice president, the Buffalo Union Furnace Co., Buffalo, N. Y.; Harry Yates, vice president and treasurer, the Buffalo Union Furnace Co., Buffalo, N. Y.;

MONTHLY PRODUCTION.

	1917.	1916.	1915.
Jan.	3,159,839	3,171,878	1,591,024
Feb.	2,649,935	3,078,548	1,666,592
Mar.	3,255,813	3,327,630	2,046,280
Apr.	3,319,809	3,225,496	2,114,518
Total 4 mos.	12,385,396	12,803,552	7,418,414
May	.....	3,364,584	2,255,157
June	.....	3,213,818	2,369,932
Total 1st half.	.....	19,381,954	12,043,503
July	.....	3,221,127	2,563,311
Aug.	.....	3,197,838	2,774,825
Sep.	.....	3,208,041	2,834,342
Oct.	.....	3,508,180	3,120,340
Nov.	.....	3,317,805	3,035,235
Dec.	.....	3,184,178	3,201,605
Total 2d half	.....	19,637,169	17,529,658
Grand total	12,385,396	39,019,123	29,573,161

Harry Halsey Cook, sales manager, Titanium Alloy Manufacturing Co., Niagara Falls, N. Y.; Robert N. Keeney, open hearth superintendent, Atlantic Steel Co., Atlanta, Ga.; James C. Rea, manager of factories, Oliver Iron & Steel Co., Pittsburgh, Pa., and Walther Mathesius, superintendent, blast furnaces, Illinois Steel Co., South Chicago, Ill.

The New Jersey Zinc Co. has loaned 100 acres adjoining its plant to the boroughs of Franklin and Ogdensburg, N. J., for cultivation. The Penn Steel & Iron Co., Ltd., Lancaster, Pa., has turned over a tract adjoining its plant to its employes for cultivation.

APRIL PIG IRON

States.	No. of stacks.	No. in blast last day of month. Apr.	Mar.	Total tonnage made. Merchant.	Non-Merchant.	Totals— Apr.	Mar.
Pennsylvania	155	130	132	267,129	1,088,382	1,355,511	1,330,529
Ohio	77	71	69	186,856	566,130	752,986	748,075
Alabama	46	30	31	149,034	95,258	244,292	258,829
Virginia	22	10	10	41,178	.....	41,178	33,116
New York	26	19	19	74,836	110,084	184,920	176,590
New Jersey	6	2	1	7,863	.....	7,863	6,271
Illinois	24	23	22	53,493	252,883	306,376	300,328
Colorado	6	4	4				
Indiana	12	12	9	37,504	219,709	257,213	233,008
Maryland	4	4	4				
Wisconsin	6	5	5				
Kentucky	7	3	3				
West Virginia	4	4	4	44,525	32,879	77,404	82,083
Tennessee	17	9	11				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	3	3	3	35,185	21,567	56,752	54,506
Michigan	3	3	3				
Missouri	1	1	1				
Spiegel—All states....						13,757	12,226
Ferro—All states.....						21,557	20,252
Totals	425	333	331	897,603	2,386,892	3,319,809	3,255,813

Scrap Declines in West

But This Attributed to Easier Traffic Conditions Necessitating Lighter Buying—Underlying Conditions Strong

Chicago, May 1.—After a long-continued period of rapidly rising prices on iron and steel scrap, a slight decline has been made during the past week. Prices sagged 50 cents to $1.50 per ton on most grades. Rerolling rails did not follow this trend, advanced about $2 per ton. The change in the market is believed to be only a readjustment and underlying conditions are such that a renewal of advance is expected shortly.

Most consumers have been buying freely. Somewhat better deliveries on the part of railroads now have rendered this less necessary and for several days buying has been restricted. This probably has brought about much of the decline. About 9,000 tons of railroad scrap is now being offered. The North-Western railroad offers 5,000 tons, including 700 tons of railroad wrought; the Chicago, Milwaukee & St. Paul railroad, 3,900 tons, including 1,200 tons of railroad wrought, and the Chicago Great Western railroad, 200 tons.

Heavy Steel Sought

Philadelphia, April 30.—Wrought scrap and its substitutes continue the most active descriptions in the scrap market in this district. Sales of numerous fair-sized tonnages are reported. Demand for the foundry grades of scrap also continues good. Further price advances have developed during the week. These are $2 per gross ton on rerolling rails, low phosphorus steel and No. 1 railroad wrought, $1 on malleable and 50 cents on wrought pipe. Demand for heavy melting steel in this district is improving and one eastern Pennsylvania mill is inquiring for a large tonnage.

Melters Paying Higher Prices

Pittsburgh, May 1.—Minimum prices of iron and steel scrap gradually are disappearing. Melters are offering $28 a ton and above for heavy melting steel, and considerable stock has been sold at as high as $29.50. Consumers in the Youngstown and Sharon, Pa., districts have been buying fairly heavy tonnages of this grade. Low phosphorus steel scrap for shipment to plants in the immediate district is commanding $37; even above that price has been paid for eastern delivery. No. 1 and heavy breakable cast scrap have advanced about $1 a ton this week. Heavy demand exists for machine shop turnings and borings, which are up 50 cents.

Dealers Are Optimistic

Cincinnati, April 30.—Buying in the iron and steel scrap market has fallen away slightly. Prices are unchanged from last week, but are firm. Dealers are optimistic over the future of the market, and predict higher prices soon. Shortage of railroad equipment continues to seriously handicap shipments. Heavy melting scrap is quoted from $24.50 to $25 a gross ton, and No. 1 machine cast from $21.25 to $21.75 a net ton, both f. o. b. Cincinnati.

Offerings Very Scant

St. Louis, April 30. — No change is shown in the old material market in general. Prices remain virtually the same as a week ago. Consumers are eager for material and willing to pay asking figures, but brokers are dubious as to selling short, and are offering only such scrap as they have on track. The shortage is more pronounced than ever. Country offerings are extremely light, and the railroads are offering only about 10 per cent of the tonnage they usually place on the market in the spring. Heavy melting steel and No. 1 and No. 2 railroad wrought are especially scarce. Heavy section relaying rails are commanding fancy prices. The only railroad offerings this week were 400 tons by the St. Louis Terminal Association and an open list by the New York Central.

Southern Advance Continues

Birmingham, May 1.—Demand for iron and steel scrap in the Birmingham district remains very active and quotations are taking on new strength weekly. Upward changes in practically every grade were established during the past week. Old steel axles have held around $35 to $36, but old steel rails have advanced and heavy melting steel is $2 higher. Tram car wheels advanced more than $3 per ton. Stove plate is in demand and quotations are higher.

Market Becomes Listless

Cleveland, April 30. — Scrap quotations have not been changed materially during the last few days, but the market is waiting with a heavy undertone. Probability of any extensive dealing in the near future seems remote. Most of the larger consumers are well stocked up; some of them having bought heavily from eastern centers, particularly Buffalo. Considerable business has slipped away from Cleveland dealers to sellers in other centers who have been willing to shade the local quotations. There is little trading between consumer and dealer, and it is almost impossible for dealers to buy from producers. Transactions among the dealers themselves are much below normal. The market here is not expected to remain long in its present state owing to the continuing general advance in various iron and steel products. Heavy melting steel is quoted strong at $27.50 to $28. A local steelmaker bought 5,000 tons or more at $27.50, delivered.

Wrought Now Becomes Scarce

New York, May 1.—Wrought and foundry grades continue to reflect most of the activity in scrap. Wrought now is becoming scarce and as a result high prices are expected to be bid for the scrap in the lists of the New York Central and other railroads which are to be closed this week. The only price advance is in No. 1 heavy cast, which now is quoted at $25 to $25.50 per gross ton, delivered New Jersey points, an advance of 50 cents. A sale of heavy cast to an eastern Pennsylvania consumer is reported to have been made at $29, delivered. Heavy melting steel at present is quiet.

More Scrap Embargoes

Buffalo, May 1.—Cast scrap is leader of the week in the market's activity, and No. 1 railroad and machinery cast has stiffened from $27 to $27.50. Dealers report that one or two embargoes in the Pittsburgh district are delaying shipments, and that inability to get labor is another retarding force to a free movement of material. All prices are very strong. No further developments have occurred in connection with the Canadian embargo on shell turnings.

Chrome Ore Active

New York, May 1.—Demand for chrome ore is active and numerous bookings of lots ranging up to 300 tons each are reported. Most of the ore now being sold is for shipment from Canada and averages around 30 to 35 per cent chromic oxide. This ore in the lump form is being sold on the basis of $32.50 to $35, delivered, on the basis of 30 per cent ore, with a premium or penalty of $1 for each unit above or below 30.

(*For complete prices see page* 1008.)

Arrange For War Steel

Steel Manufacturers at Conference Determine Distribution of Government Supplies—600,000 to 1,000,000 Tons Required

Arrangements for the important work of supplying the government with the steel it will require for war were made at a meeting of leading steel manufacturers of the country held at the offices of the United States Steel Corporation, April 26. It was decided unanimously to approve the recent action of the general committee appointed by the American Iron and Steel Institute in establishing prices upon the plates, structural shapes and bars to be furnished the government. These prices are 2.90c, Pittsburgh, for plates and 2.50c, Pittsburgh, for structural shapes and bars. Following the meeting, Judge Gary stated that the government's plans, as so far developed, would call for between 2 and 3 per cent of the country's output this year. This roughly would be equivalent to 600,000 to 1,000,000 tons of rolled finished or semi-finished products.

"All those present," Judge Gary stated following the meeting, "announced their willingness to comply with the request of government officials to have the tonnage covered by the program for 1917 for war materials distributed among the manufacturers in proportion to their capacity. The meeting approved the suggestion of the American Iron and Steel Institute committee to have the total steel requirements of the government managed through a clearing house committee with offices in Washington. The disposition shown by the manufacturers without exception was patriotic and enthusiastic."

The committee in general charge of the division of the government orders was appointed as follows: E. H. Gary, ex-officio; James A. Farrell, E. G. Grace and E. A. S. Clarke. A sub-committee on alloys also was appointed, consisting of E. H. Gary, ex-officio; James A. Farrell, E. G. Grace, and E. A. S. Clarke. The members of the committee, however, will not be required to spend all their time in Washington, James B. Bonner, Philadelphia representative of the Carnegie Steel Co., having been designated as the active agent of the committee. Mr. Bonner will devote most of his time to the service of the army and navy departments until the government steel requirements have been distributed and the work is well under way. Among those to attend the meeting, in addition to those comprising the committees, were: A. C. Dinkey and W. B. Dickson, Midvale Steel & Ordnance Co.; J. F. Wellborn, Colorado Fuel & Iron Co.; James A. Campbell, Youngstown Sheet & Tube Co.; R. H. Irons, Central Iron & Steel Co.; Veryl Preston, Eastern Steel Co.; S. P. Ker, Sharon Steel Hoop Co., and Henry Oliver, Oliver Iron & Steel Co.

Government Withholds Details of Orders

Washington, May 2. (By wire.)—The war and navy departments are withholding details as to large emergency orders being placed for shells and guns of all types from rifles and submarine chaser weapons to heavy ordnance. Officials will not confirm report seemingly reliable that one contract alone calls for 2,000 field pieces of heavy calibre. Published reports as to orders for guns having been placed with the Bethlehem Steel Co. largely are fiction.

JOHN WOODRUFF DIX

No Contracts for Ships

Baltimore, May 1. (By wire.)—Theodore Brent, a member of the shipping board, stated this morning that no contracts for wooden boats have been awarded yet. The board will let contracts for the construction of these vessels when standard plans are completed. No ships will be built by the board itself, but it will depend upon private contractors for all construction. The problem of furnishing the machinery, boilers and sheet metal for tanks, etc., for the new fleet is giving authorities great concern.

J. W. Dix, Carnegie Official, Dies

John Woodruff Dix, assistant general manager of sales and structural engineer of the Carnegie Steel Co., Pittsburgh, died unexpectedly at Atlantic City, April 28. Mr. Dix had been in ill health only a short time. He was born at New Brighton, Staten Island, N. Y., Aug. 4, 1873, and after being graduated in 1894 from the civil engineering college of Cornell University, he accepted a position with the Keystone Bridge Works, Pittsburgh.

Mr. Dix joined the Carnegie Steel Co. in 1897, as a draftsman in the bureau of engineering of the general sales department. When the general sales department was divided into three bureaus in 1902, Mr. Dix was appointed assistant to the chief of the bureau of structural shapes and plates. He was appointed assistant general manager of sales and structural engineer July 13, 1914, succeeding John C. Neale, who resigned to become president of the Central Steel Co., Massillon, O. Mr. Dix lived at Sewickley, Pa.

Mr. Dix was a member of the Military Order of the Loyal Legion of the United States; Fellowship Lodge, Free and Accepted Masons; Pennsylvania Consistory, Ancient Accepted Scottish Rite of Free Masonry; the American Iron and Steel Institute; the Pittsburgh Club; the Duquesne Club and the Allegheny Country Club. He is survived by his parents, Mr. and Mrs. George W. Dix of New Brighton, and a brother, George E. Dix of Philadelphia.

Will Meet Jointly

The annual convention of the National Machine Tool Builders' Association will be held in Cincinnati, May 21 and 22. The American Society of Mechanical Engineers will also hold its annual convention in Cincinnati, May 21, 22, 23 and 24. A joint business session of the two organizations will be held May 22, and all entertainment features will be held jointly. The programs for the two conventions will be made public next week.

The Pittsburgh Aluminum Co., Pittsburgh, recently has been incorporated with a capital stock of $20,000. The officers of the company are: President, C. F. Miller; manager, William J. Graney. The company has a daily capacity of 3,000 pounds of notch, bar and ingot metal.

Reduced Buying

In Cars is Continuing—Russia Buys Locomotives

New York, May 1.—Car orders continue to be placed at a reduced rate reflecting manifestly the high prices and delayed deliveries of steel and other raw materials. Total orders for cars placed in April were about 5,800, a comparatively light month. Reported locomotive awards in April were approximately 400 of which almost half were for foreign account. The Baldwin Locomotive Works in recent weeks has received new orders from the Russian state railways, calling for 278 locomotives.

The Midvale Steel & Ordnance Co. has placed 1,000 hoppers with the Cambria Steel Co.; the Duluth & Iron Range 50 gondolas with the Western Steel Car & Foundry Co.; the Boynton Refining Co. 25 tank cars with the Pressed Steel Car Co.; the Carnegie Steel Co. four gondolas with the Pressed Steel Car Co., and the Houston Collieries Co. 200 mine with the Pressed Steel Car Co.

Tonnage Pared

To Ordinary Wire Buyers in Government's Behalf—Prices Strong

Cleveland, May 1.—A policy of restricting new sales of wire products for forward delivery in order to provide for government accommodation is being followed by leading makers. Where buyers have sufficient tonnage to their credit in unshipped specifications or in unspecified material, to meet their normal requirements for the third quarter, they are being refused any new tonnage for that period. The leading maker retains his practically nominal quotations and has not opened his books for third quarter contracts. This producer, however, effective April 28, advanced boat spikes from 4c to 4.25c, Pittsburgh. Some independent wire producers now are refusing to sell even at the new $6 advance.

Advance Now Established

Pittsburgh, May 1.—Independent manufacturers of wire products have established the market at $3.50 a keg for nails, $6 a ton above the nominal price of the American Steel & Wire Co. This is the first advance effected by independents in many years. As has been the case for many months, wire-makers are giving consumers only about 50 per cent of their estimated requirements. Indirectly, this is the result of the war. Some interests virtually have withdrawn from the market, being unable to assume additional obligations. Numerous inquiries for barb wire are pending for shipment abroad.

Wire Market Quiet

Chicago, May 1.—Little selling of wire and its products is being done and conditions are generally quiet. The advance made recently by independent makers has not been recognized officially by the leading interest, which is practically out of the market pending government developments.

War Needs

Cause Vigorous Specifications by Packers for Tin Plates

Pittsburgh, May 1.—Packers supplying the army and navy with food are specifying briskly for tin plate. Scarcely any additional tonnage is available for shipment this year. No new sales have been reported in the open market for several weeks. Prices are nominal. Shipments reflect improvement.

Again Attacks Merger

Action again has been instituted by Charles H. Venner in the federal court at Newark, N. J., to prevent the dissolution of the Pennsylvania Steel Co. and the transfer of its assets to the Bethlehem Steel Co. Judge Rellstab on May 1 permitted him to file a supplementary bill in the suit which he brought a year ago.

Bessemer Tonnage

Sought at Pittsburgh—Foundry and Malleable Advance

Pittsburgh, May 2. (By wire.) — Inquiries for 30,000 tons of last half bessemer have appeared, including 20,000 tons for a middleman, 5,000 tons for a consumer, and 5,000 tons in scattered inquiries. Foundry and malleable are selling at $43, valley, or $1 above the prevjous price. Railroads in this and eastern territory are buying heavy tonnages of coal. Prices have advanced 50 cents to $4.25 for run of the mine. Warehouse steel prices, effective today, were advanced, plates rising $10 and shapes $5. Bars remained unchanged. Light rails are up $5 a ton, this territory.

To Exhibit War Devices

The fourth national exposition of safety and sanitation will be held in Grand Central Palace, New York, Sept. 10 to 15, under the auspices of the American Museum of Safety and the National Safety Council. The exposition will be devoted especially to safety devices applicable to modern warfare and will include gas masks, stabilizers for aeroplanes, improved first aid apparatus, etc.

The Diamond Coal & Coke Co., Pittsburgh, has purchased 2,000 acres of coal lands along the Allegheny river below Springdale, Pa. Contracts for the sinking of shafts and the erection of tipples will be awarded at an early date.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, May 1.—Metal market sentiment has improved considerably the past few days, due largely to growing assurance that the government's purchases of metals for munition work will not unduly depress the market. Practically all the metals have advanced in price the past week.

The tin statistics, as of April 30, indicated a strong technical position for this metal. Stocks at the close of the month amounted to 1,707 tons, or less than two weeks' deliveries into consumption on the basis of April deliveries of 3,800 tons from Atlantic ports. The tin market has been dull, with consumers reluctant to pay the present prices and holders confident that even higher prices will be recorded. The nominal quotation for spot Straits tin today is 58.87½c.

Copper, after a period of uncertainty, showed definite signs of strength as this week opened, all positions being quoted at least 1c higher today than a week ago. Quotations for electrolytic copper, on the basis of cash, New York, follow: Prompt, 32c; May, 31c; June, 30c; third quarter, 29c. Prime lake is firm and quiet at 31c to 31.50c for nearby shipment. Casting copper for prompt delivery is quoted about 28c to 28.50c.

Galvanizers entered the spelter market toward the close of last week and bought actively for a time. This movement, together with some speculative activity, caused a sharp advance in the price of prime western from 8.75c, St. Louis, on Friday, to 9.50c on Monday. Today no metal seems obtainable for delivery before July at less than 9.50c, St. Louis, while third quarter is quoted about 9.25c to 9.50c. Brass special is quoted about 10c to 10.25c, St. Louis.

Lead producers have been booking a heavy business for May and June delivery and the market for these positions is stiff. There is practically no spot lead obtainable in the east, while prompt shipment from the west is quoted about 10c, St. Louis; May, 9.87½c; June, 9.75c; third quarter, 9.50c.

(*For complete prices see page* 1008.)

The Future's Requirements in Tools

The Progressive Machine Builder is Constantly Striving to Eliminate the Human Factor to as Great a Degree as Possible in Order That Shop Equipment May Be Standardized

BY A. M. SOSA

OUR STANDARD for improving machine tools is based on the general principle of simplifying manual operations as much as is consistent with the quality of the finished product and cost of production. We propose not only to make manual operations easier, but to eliminate manual operations as much as possible. We can time a machine and standardize its product much better than we can standardize the operator. We are now satified that, at least in a mechanical sense, machines can do what men can do.

We have in modern machine tools automatic stops, power quick traverse, belt shifters, tool lifters, sizing grinders and numerous attachments with which we are familiar. These attachments add in each case some part, and in some cases complicated mechanisms, to the original machine in order to increase its output. The increase and dependability of the output justify the additional expense.

Accessories do not affect the standard construction or the fundamental lines of the machine to which they are applied. Changes that affect the fundamental construction are of such blended character that it is difficult to point out the different steps of the transformation. The total advance may be appreciated by comparing the modern machine with its equivalent 25 years ago, and the most influential details in this advance can be attributed to the perfecting of the gear wheels and their combinations.

In the early days it was not permissible to feed a tool with rack and pinion motion nor to drive a cutter with an all-gear combination; the tooth marks were too clearly visible. And it was not all the fault of workmanship, as imperfect applications of gear trains were many times the cause of such poor results. We can say in general, that positive transmission of motion and quick change gear combinations are the prominent details that characterize the modern machine tool. The further perfecting of gear trains and their combinations will bring about the modification of some of those gear changes, now left to the will of the man who runs the machine.

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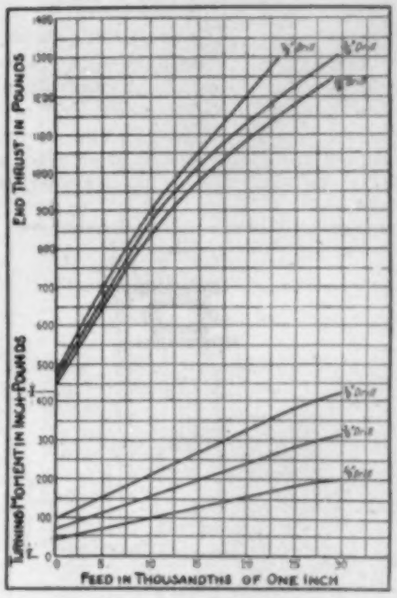


FIG. 1—DRIVING AND THRUST PRESSURES

Changing tools in a drilling machine is ordinarily very frequent. The diameter of the tool is charted with its corresponding speed in revolutions per minute. A quick change of the position of one or two levers and the proper speed is given to the tool. But to feed this tool properly is a consideration not quite so simple. In the first place, excessive feed and not excessive speed will break the tool. In the second place, if excessive speed burns out the tool, the feed again will break the tool or the machine. The feed is, in both cases, the more important change of the two. A drilling machine, on account of its constructive capacity, admits of two or three times as many speeds as it does feeds, for the reason that all the feed-change gears must be comprised in the head of the machine. The result is that the same feed is charted for a considerable number of tool diameters. The amount of feed given on the chart will feed the tool properly after the cut has been started and brought to full diameter. Ordinarily the operator will start feeding by hand previous to connecting with power feed, making certain that the tool is cutting freely, and also will finish feeding by hand in many instances to prevent a breakage as the tool comes through the metal. When using tools with stop collars to gage depths in connection with jigs, it is also necessary to feed by hand against such stops. Consequently, the operator, after making the necessary feed changes, will feed by hand the greater part of the time. Power feed in such a machine does not meet all of the requirements, being a hand operated mechanism.

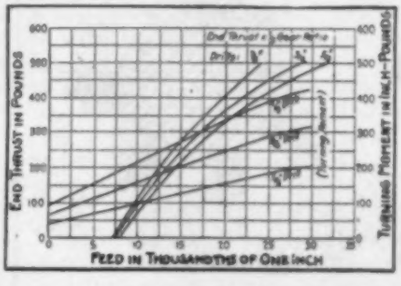


FIG. 2—PRESSURES FOR VARIOUS FEEDS

Fig. 1 illustrates in condensed form the results of numerous tests for determining the values of the end pressure needed to feed the tool, and the torque required to drive the same tool. The values of three tool diameters are given: 5/8 inch, 3/4 inch and 7/8 inch. There are two curves given for each side, one for the value of the end pressure or thrust, and one for the value of the turning moment or torque. The upper curves, for end pressure, read pounds on the vertical scale corresponding to feeds on the horizontal scale in thousandths of an inch. The lower curves, for the turning moment, read pounds at one inch radius on the vertical scale corresponding to feed in thousandths of an inch on the lower scale. For example, the end thrust required to feed a 5/8-inch drill with an 0.011-inch feed is 875 pounds, and the torque required to drive it is 100 inch-pounds.

The driving force and the feeding force are so related in the actual action of cutting that the one cannot exist without the other, they are two component forces, and their values are functions of each other. These values, as given in Fig. 1, vary in the same direction, but not proportionally, as may be seen by the relative obliquity of each two curves for the same diameter of tool. It will be seen that as the feed increases, the end pressure increases more rapidly

than the turning moments required. A small bevel pinion driving a double bevel gear running loose on the spindle is the source of power in a machine designed to eliminate hand feedings. Meshing with the lower half of the double bevel gear are two bevel pinions running loose on trunnions that project from a sleeve. This sleeve drives the spindle by means of a sliding key. These bevel pinions are called planet pinions, and meshing with them is another bevel gear, called the supporting gear, around which the planet pinions roll when driven by the first driving gear. The supporting gear runs loose on the spindle, together with a spur gear, which is the first member of the feed train of gearing.

The supporting gear is positively geared to the spindle for feeding. Its motion is proportional to the feeding movement of the tool, and if the tool does not advance, this gear will not turn. The driving sleeve is carried by planet pinions at one-half the speed of the first driving gear as long as the supporting gear does not turn, but as the speed of the supporting gear is very low, when the tool is feeding, it only slightly affects the spindle speed.

The planet pinions exert a tooth pressure on the supporting gear equal to one-half the pressure effective on their trunnions, measured on a radius equal to the pitch radius of the supporting gear. This pressure is transmitted through the feed train of gearing down to the end of the tool. The amount of tooth pressure on the supporting gear and the amount of end pressure on the tool, depend on the gear ratio of the feed train of gears. The pitch radius of the supporting gear multiplied by its tooth pressure equals the turning moment given in Fig. 1. The tooth pressure of the supporting gear multiplied by the feed-gear ratio equals the end pressure given in Fig. 1.

Fig. 2 is a modification of Fig. 1. The turning moments are the same as before, but by introducing a feed-gear ratio of about 5 to 1, the values corresponding to end thrust are reduced by a factor of 5. The curve for end thrust in this diagram represents the force inside the differential gear which, multiplied by the feed-gear ratio, will produce a force five times greater to feed the tool. A factor was selected high enough to permit the lines of the end thrust to intersect the lines of the turning moment. As the feed increases, the two lines that correspond to the given diameter advance until they intersect. The point of intersection represents the amount of feed reached when the two forces are in equilibrium. With the gear ratio assumed in the present example, a ⅞-inch tool will reach and maintain a 0.015-inch feed; a ¾-inch tool will reach 0.013-inch, and a ⅝-inch tool will reach 0.011-inch feed. Fig. 3 represents the head of a radial drill mounted on the arm of the machine. The horizontal shaft, inside the arm drives a second horizontal shaft at right angles. This second shaft carries a bevel gear which meshes with the two bevel gears shown near the bottom of the figure. A clutch between these two gears serves to drive the vertical shaft in either direction. The reversing clutch will change the direction of rotation of the whole train of driving and feeding gears. The reversing-clutch lever has two positions that correspond to the upward and downward movement of the spindle. It is operated by hand or is tripped by a collar on the spindle, striking an adjustable dog on a vertical rod, shown in a parallel disposition to the spindle. This rod is arranged to throw the clutch into the reversing position automatically. If the tool is in operation and the reversing clutch is tripped, the tool will withdraw from the work, and will do so whether the tool is a drill or a tap. If, on the other hand, the clutch is thrown in, the tool will advance until striking the work.

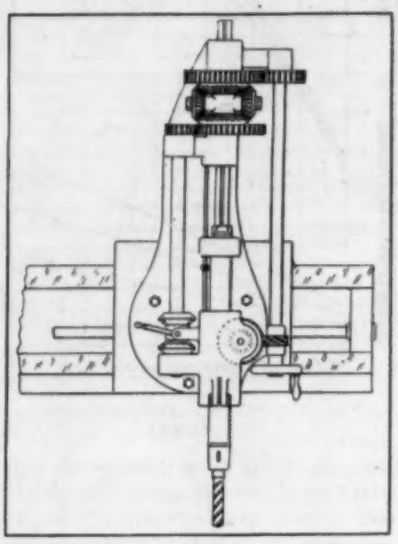
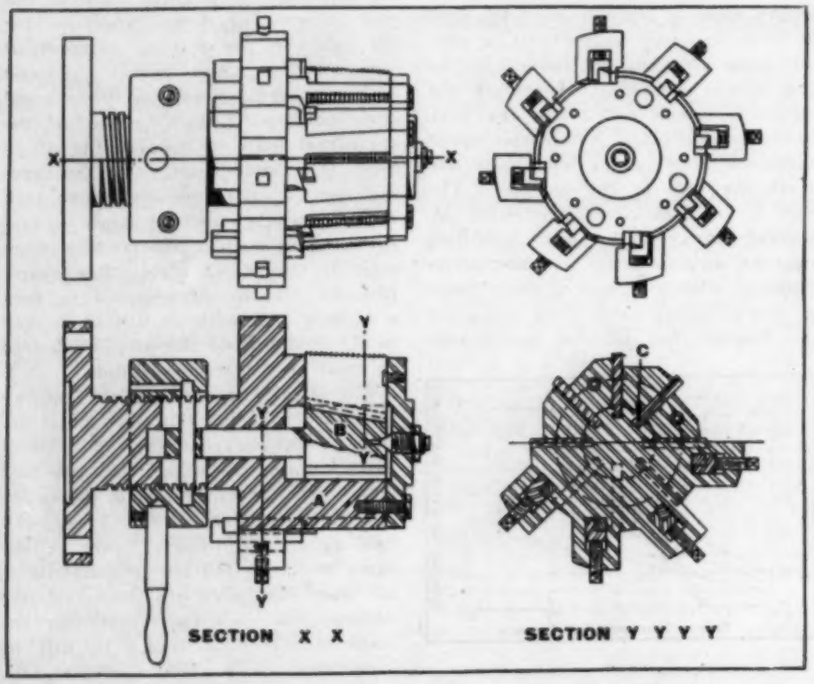


FIG. 3—HEAD OF RADIAL DRILL

It may be stated that the idle movement of the spindle, before the tool strikes the work or after reversing, will be a rapid movement. The hand wheel shown on the right-hand side is operative at any time and whether the tool is under cut or not, except in the case of a tap, when the reversing clutch must come into action. Stop collars on drills will be effective when feeding by power. A machine designed on such principles would eliminate the human element so far as the feeding operation is concerned.



SECTIONAL DRAWINGS OF TAP FOR MAKING PIPE COUPLINGS

Tap for Making Pipe Couplings

The Pittsburgh Tap & Die Co., Monaca, Pa., recently has developed a collapsing, recessing and facing tap, designed to make couplings for pipe ranging from 4 inches to 24 inches

in diameter. The tap is illustrated in the accompanying drawings. Only one setting of the tap is required to finish a coupling from a forged blank. The tap, which is of simple design and construction, can be used on any type of vertical live spindle machine where the work is stationary and the tap revolves.

The main body of the tap, indicated at *A* in the sectional drawing, is bored to receive the conical shaped chaser expander, *B*, which has a number of radially disposed grooves and bits, *C*, in sectional drawing *YYYY*, which engage with grooves in the chasers. The expander is connected to a threaded split head by means of a pin which passes through the stem of the expander and engages in a circular slot in the head. By means of diametrically opposed handles, the head is screwed back on the coarse threads, moving the expander longitudinally in the body, and causing the chasers to rapidly recede or expand laterally in radial slots in the body of the tap. This permits the tap to be withdrawn from the work without damaging the threads. A set screw makes it possible to set the chasers within one one-thousandth of an inch to any desired size in the range of the tap.

Another interesting feature is the interchangeability of chasers of different pitches, which gives the tap body a large range of sizes and pitches. A number of lugs with radial openings are on the body; each of these contains a reamer with a longitudinal groove to receive a facing cutter. The cutters are clamped securely in the lugs and may be readily adjusted. Ample clearance in the chasers is provided by the omission of alternate teeth.

Builds New Tools

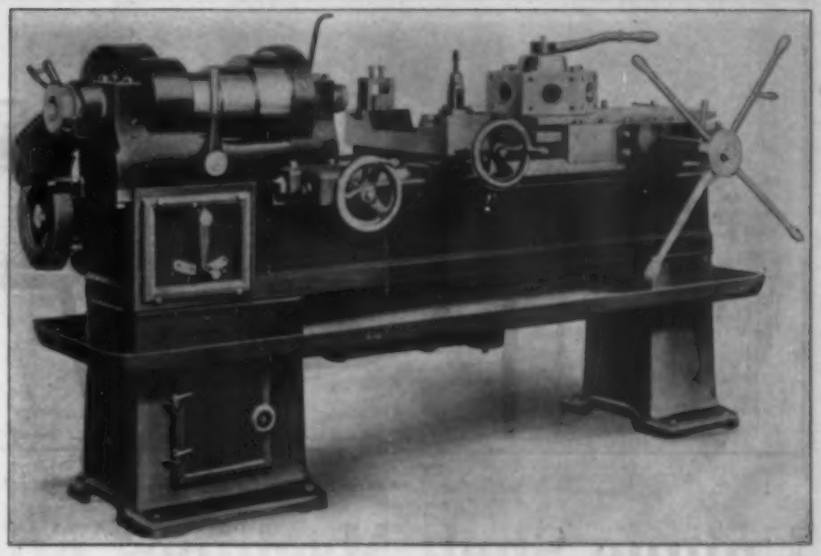
The Oliver Machinery Co., Grand Rapids, Mich., has recently developed a 16-inch heavy-duty turret lathe. This tool is of the double back-geared type with a 3-step cone using a 3¼-inch belt. The headstock column is provided with a door and corner brackets for inside shelving. The bed is reinforced by boxed sections and the supporting columns are so placed that no overhang occurs at the end of the bed. The standard bed is 7 feet 2 inches long, 13 inches deep and 15 inches wide.

The turret head revolves on a close-fitting stud and the builder claims that unless very heavy cuts are being taken it is not necessary to use the clamping lever at each operation. By forcing the turret slide back by means of the hand wheel the locking plunger is automatically released and the head revolved to the next station. The turret is self indexing. A reducing gear mechanism is furnished with the turret lathe by which the hand feed power of the turret is increased in the ratio of one to four. This reducing mechanism is not required on lathes with wire feed attachments and is not part of the standard equipment. The turret slide is connected to the spindle by means of gearing and may be operated by positive power feed. The change to hand feed is accomplished by a trip lever dropping the worm out of mesh with the worm wheel. The feed shaft is keywayed for 30 inches from the end permitting the whole turret mechanism to be moved close to the head stock. One lever is used to throw the turret in or out of gear.

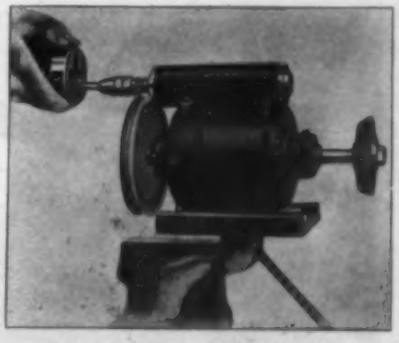
The feeds are driven by chain from the spindle to the box. The feed box is on the bed in the rear of the machine and is controlled from the front of the tool.

The cross slide has a 12-inch longitudinal travel and the hand wheel is graduated to 0.001-inch. The slide is 6 inches wide and is equipped with taper gibs. The machine has a 17½-inch swing over the shears, 8 inches over the tool post and 34½ inches between the turret and the headstock spindle. There are 18 spindle speeds ranging from 14 to 335 revolutions per minute. The 16-inch turret lathe weighs 3,600 pounds crated.

The 2¼-inch screw machine embodies several unusual features but is essentially of the same design as the turret lathe. This tool weighs 4,300 pounds crated.



SIXTEEN-INCH HEAVY-DUTY TURRET LATHE



GRINDER FOR THREAD DIES

Manufactures Grinder

The Wisconsin Electric Co., Racine, Wis., builder of small motors and accessory equipment, has recently brought out a high-speed grinder for use on thread-cutting dies. The builder states that one reason for bringing out this particular equipment is the fact that thread-cutting dies, especially standard button dies, are difficult to obtain. The tool shown in the accompanying illustration is equipped with a carborundum pencil mounted in a chuck on a small shaft which is driven by a belt from the wheel mounted on the armature shaft of the motor. The button dies are reground by passing this pencil through the four holes in the die. Grinding the sides of these holes sharpens the teeth or cutting edge. The die may be then dressed to grind a champfer. The speed of the grinding spindle is 50,000 revolutions per minute. This tool may be used for lapping out small holes in blanking dies. The chuck holds a ⅛-inch round pencil.

The Westinghouse Electric & Mfg. Co. has completed a contract for 7-inch shells for the entente nations at its Twenty-eighth street plant at Pittsburgh.

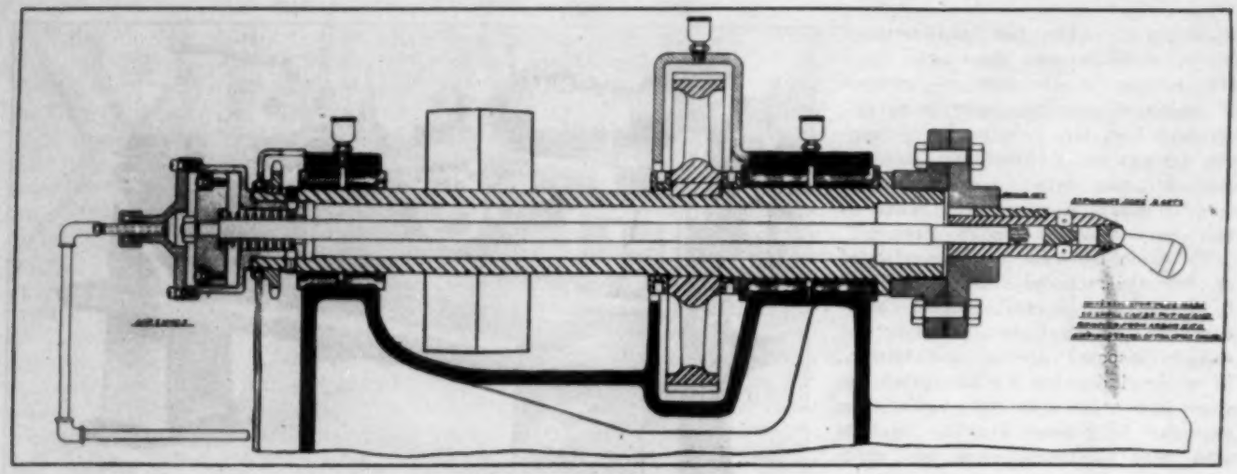


Fig. 1—A Universal Joint Applied to a Jig Proves a Time Saver

Unique Shell Machines Effect Economies

THE newspapers and semi-technical press have led the public to believe that the possession of a war order for munitions is akin the ownership of a goose that lays golden eggs. Quite the contrary — although manufacturers in this country have been uniformly successful in the production of shells for the entente allies, most of the profits have been made on narrow margins at the expense of considerable effort in the design of the necessary equipment and ingenuity in shop practice. When, in the first months of 1915, orders for English, French and Russian munitions were placed among the manu-

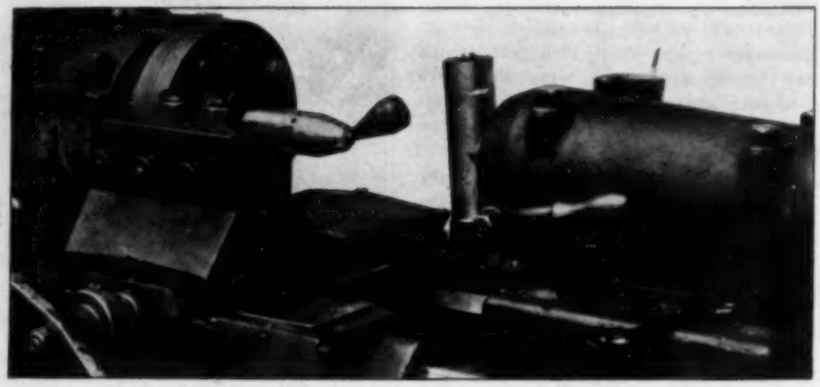


FIG. 2—HEAVY CONSTRUCTION ELIMINATES VIBRATION

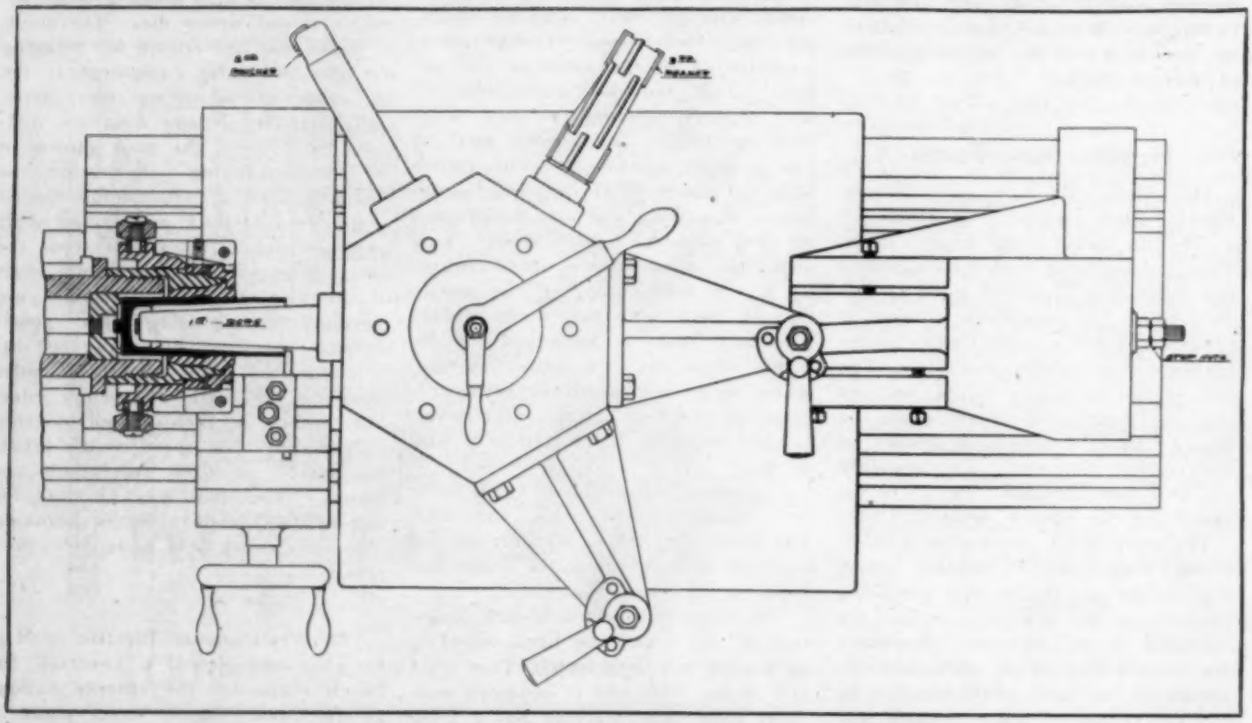


FIG. 3—TURRET LATHE FOR FIRST BORING OPERATIONS

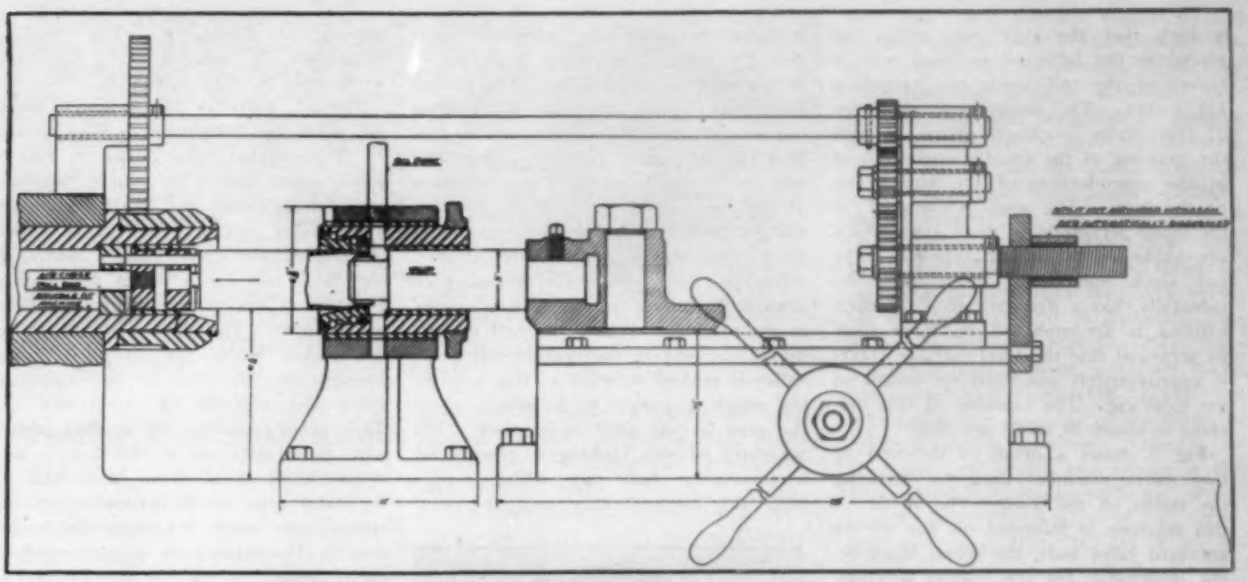


FIG. 4—SECTION SHOWING CONSTRUCTION OF STEADY REST

facturers of this country many shops were supplied with special equipment designed for shell making; others, not wishing to make heavy investments or not desiring to wait months for delivery, designed and built their own machines. Descriptions of the machines built by tool makers for ammunition work have been published from time to time in *The Iron Trade Review* but comparatively little has been printed in regard to the equipment designed and built in many of the shops producing munitions. It is of interest therefore to note some of the features of the machines made in one shop which turned out a large number of Russian and English shrapnel shells. The data from which the illustrations and information for this article were taken were prepared for the Russian government to cover the manufacture of shrapnel from the rough forging to the completed shell.

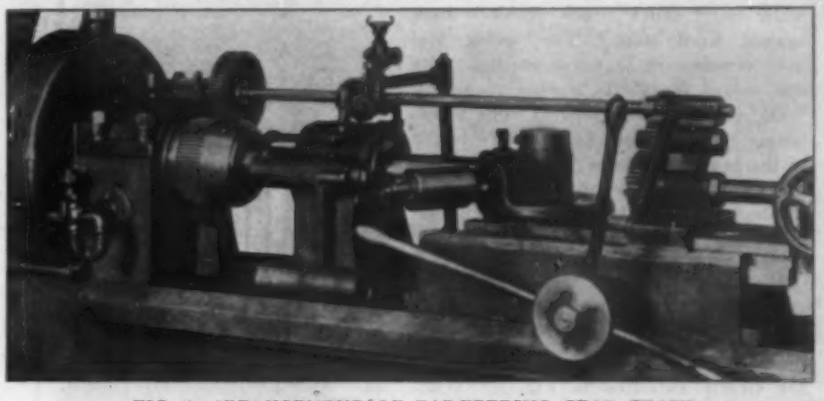


FIG. 5—ARRANGEMENT OF TAP-FEEDING GEAR TRAIN

Wide Use of Compressed Air

The machines described in this article are provided with standard lathe beds and head stocks, with modifications for performing many of the different operations. The lathes are uniformly simple in construction and are proportioned to eliminate as nearly as possible the source of error due to vibration and chatter. The wide use of compressed air in chucks and even for pressing the copper bands into place is a notable feature of the plant under consideration. The machine shown in Figs. 1 and 2 is used to take the first roughing cut. A unique time saving device is the universal stop-plug which is so arranged with a ball joint that the shell forging may be put into place and removed with a minimum travel of the tail stock. This plug takes the end pressure on the shell forging. The design of this point

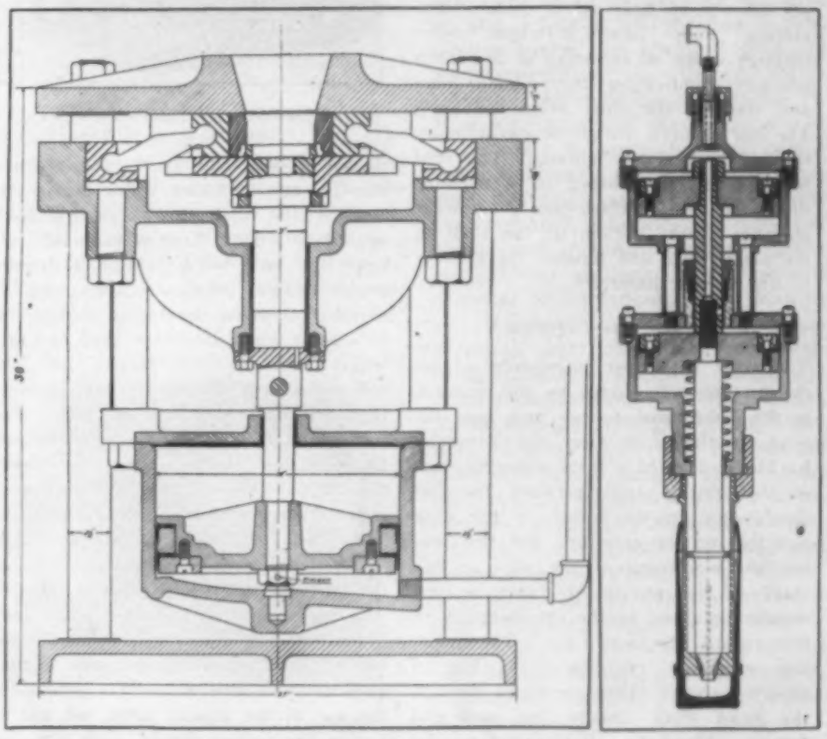


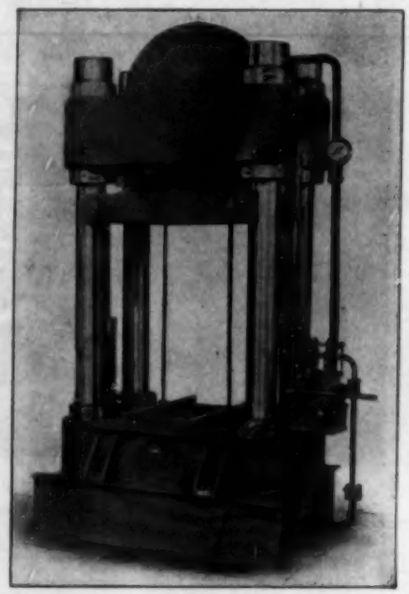
FIG. 6 AND 7—DETAILS OF BANDING PRESS

is such that the shell may either be placed in the lathe or removed with a travel of the tail stock not exceeding 1½ inches. The design and operation of this device is clearly shown in both the drawing of the spindle assembly and in the reproduction of the photograph of the lathe. The shell is centered on the inner periphery by three jaws which are expanded by an air cylinder. The tail stock spindle of this lathe, incidentally, has a diameter of 4¼ inches. Cutting is accomplished by three tools so arranged that the total carriage travel is approximately one-third the length of the total cut. The capacity of this machine is about 28 shells per hour.

Fig. 3 shows a detail of the first of two turret machines used for finishing the inside of the shell. The turret of this machine is mounted on one of the standard lathe beds, the turret head being substituted for the regular carriage. The shell is held in position by a pneumatic collet chuck which draws it back against fixed stops. The facing tool also remains in a fixed position. By this means the shells are cut to a uniform, predetermined length. The rough boring tool is guided by a fixture bolted to the bed of the lathe; the turret is not indexed for this operation. The contour of the cut is regulated by a roller running in a slot of the proper design in the turret head. An eccentric functioning through this roller releases the tool from the cutting position. The length of the cut is regulated by stop nuts at the rear of the fixture. These details are clearly indicated in Fig. 3. When the reamer is in use, the turret is simply allowed to float on its center. The cutting tools have 5/16-inch holes through which oil is forced at 20-pounds pressure, lubricating the cutting edge and washing the chips from the shell. The time required for all the operations on this machine is 5½ minutes. The final finishing is accomplished on a machine of similar design which cuts the powder chamber at the bottom of the shell to the proper size and finishes the interior to the correct diameters.

Accuracy is Essential

Perhaps the most interesting of all the machines developed by this concern is the lathe used to tap and face the nose of the shell after the bourrelet has been formed. It is essential that no eccentricity exist between the circumference on the inside of the nose and that on the exterior. For this reason the machining of the shell at this stage of its production must be unusually accurate, as the specifications in this regard are most rigid. The drawing which is reproduced in Fig. 4 shows a section taken vertically through the head stock, steady rest and end fixture. These are all mounted on the ways of the same type lathe bed as is used for the two machines described in the preceding paragraphs. The cutter for rough boring, finishing and facing the nose of the shell preparatory to tapping is so designed that these operations may be accomplished with one insertion of the tool. The tool and the tap are carried on a small, two-position turret head. The steady rest contains a steel collar or sleeve which is pushed back toward the turret as the shell is placed in the machine. When the shell is resting at one end in the spindle collet, the collar is pushed forward so that a bushing which is ground to fit snugly about the nose of the shell is in place. The periphery of this bushing is ground for a three-point ball race which carries both the circumference and the end-



HYDRAULIC FORMING PRESS

thrust loads. The air is then turned into the spindle collet which grasps the end of the shell and draws it back against a set of three stops which assures the shell being held in a definite predetermined position. This step is necessary because the facing tool is fed to a point which trims the shell to exact length. Air is now turned into the collet chuck on the steady rest, holding the shell in a firm true position. The boring and facing tool is guided through an extension of the same steel sleeve that carries the ball race and thus is in concentricity with it. Since both the shell and the tool are guided in the same steel sleeve, the concentricity of the two surfaces of the nose is assured. The tap is fed into the nose of the shell by a train of gears arranged over the bed of the lathe. The purpose of this peculiar arrangement is to permit of the use of the regular lathe bed and to secure the proper thread feed with the utmost of simplicity. The feeding mechanism is engaged by a split nut which may be seen in Fig. 5.

The two parts of the pneumatic banding press are illustrated in Figs. 6 and 7. The toggle joints shown in Fig. 6 which exert almost an infinite pressure when straightened are clearly indicated. The moving portion of the press is free to slide up and down upon a central 3-inch steel rod which serves as a guide. Pressure is exerted on the copper band by six jaws. The shell is supported on the inside while the band is being pressed into the slot by an expanding arbor also actuated by compressed air. This arbor consists of a steel sleeve with three slots cut to the bottom and three closed slots. Two air drums of the same type as those used upon the lathes are used for expanding this sleeve. The duplication of parts such as these drums is carried as far as is practical to reduce the number of patterns needed, and to effect economies in manufacturing. Two men can band 90 shells an hour with this press, one placing the kennels on the shells and the other operating the press.

Builds Forming Press

A press for forming fireproof shingles from an asbestos mixture has been recently developed by the Hydraulic Press Mfg. Co., Mt. Gilead, O. The machine, which is shown in the accompanying illustration, was built for Japanese export trade and will be used for forming asbestos shingles 42 inches square.

The asbestos after being thoroughly mixed with other ingredients is formed in layers and placed upon drainage plates. The drainage device consists of a steel plate, a sheet of woven wire and a sheet of duck cloth. A number of these plates with a layer of the mixed material to be pressed on each, are run into the press to extract the excess moisture and to form a layer of uniform thickness. All the operations of the press are controlled by one 2-inch four-way poppet operating valve. The press has two small push cylinders which return the main pressure ram after the pressing operation has been completed.

The track running through the press is not attached to the base of the press, but is mounted on a frame which is supported from above by four rods working through lugs cast on the platen. When the platen is at its highest point, the track is lifted a short distance from the pressure bed. As the platen travels downward, the track is lowered upon the pressure bed and the platen continues to travel over the rod which passes through the bearings in the platen

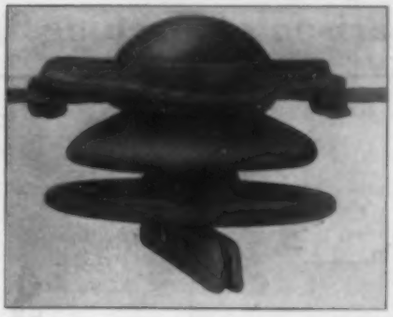
lugs. The wheels of the truck are so mounted that the bottom of the truck is slightly below the bottom of the track. When the platen starts down, it lowers the four supporting rods with the track while the truck bottom takes a bearing upon the press base, the wheels being released of all strain during the pressing operation. When the platen is returned, it again lifts the truck from the press base by raising the press track under the wheels. The press has a working surface of 42 x 42 inches and a daylight space of 60 inches.

Trolley Wire Suspension

Electrical industrial railways in coke, smelting and founding plants must be equipped with special types of overhead line material to withstand the excessive temperature. The General Electric Co., Schenectady, N. Y., has developed a special insulating suspension for trolley wires used in industrial service. The suspension is made of malleable iron, porcelain and cement and is said to give efficient service on voltages up to 600 and under conditions of high temperature. The suspension, as shown in the accompanying illustration, insulates the trolley wire from the cross span or bracket. It has a porcelain body into which a specially designed stud is cemented capable to withstand a strain of three tons. A malleable iron span yoke is provided for attaching to the span wire, and a malleable iron wheel guard affords protection against "wild" trolley poles.

Builds High-Speed Saw

The Peerless Machine Co., 1605 Racine street, Racine, Wis., has recently developed a high-speed heavy-duty cutting off saw. The principal feature of this tool is the control of the saw guide, which is overbalanced by four coil springs. These springs are mounted in such a position that strain is taken off the bearings. The feeding mechanism consists of a ratchet bar and a set of dogs mounted on one end of an oscillating arm. The other end is equipped with a roller that engages with a cam on the crank shaft. By changing the tension of the springs which force the roller against the cam, the feed pressure is increased. When the cutting stroke has been completed, the cam forces the roller down, thus relieving the tension on the feed spring. Since the saw frame is overbalanced, it raises and clears the work until the cutting stroke begins. At this point the cam releases the roller, allowing the spring to act on the oscillating arm, forcing it up, and the other end to pull down on ratchet bar.



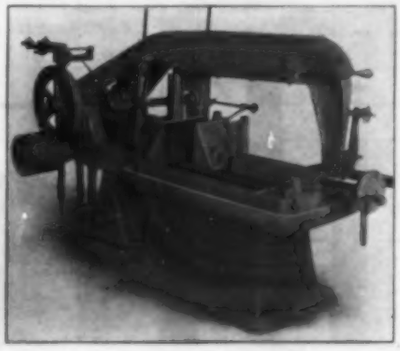
INSULATED TROLLEY WIRE SUSPENSION

The machine is driven by a set of reducing gears which are in the ratio of four to one. The large gear is keyed to crank shaft. The saw table has two T-slots, one on each side of the blade, allowing irregular work to be bolted onto the table. The slot next to saw blade is provided with two movable angle plates, preventing work from rolling after being cut off. These machines are also designed for direct motor drive and with 6-speed gear boxes. The machine shown in the accompanying illustration will take stock 13 x 16 inches, and weighs approximately 1,800 pounds.

Test of Crucible

It is said that 70 consecutive heats of brass were poured from a new type of crucible recently developed by the Lava Crucible Co., Zelienople, Pa., during a recent test in charge of F. T. Aschman, professor of chemistry, University of Pittsburgh. The test, conducted April 13-15, was witnessed by a number of brass and crucible steel manufacturers in the Pittsburgh district.

The analysis of the metal used was: Copper, 68.17 per cent; zinc, 30.16 per cent; iron, 1.05 per cent; lead, 0.11 per cent, and oxygen, 0.35 per cent. The average weight of the metal charged into a commercial No. 60 crucible was 89 pounds. The crucible lost four pounds in weight during the test and weighed 31 pounds after the seventieth heat was poured.



HIGH-SPEED CUTTING-OFF SAW

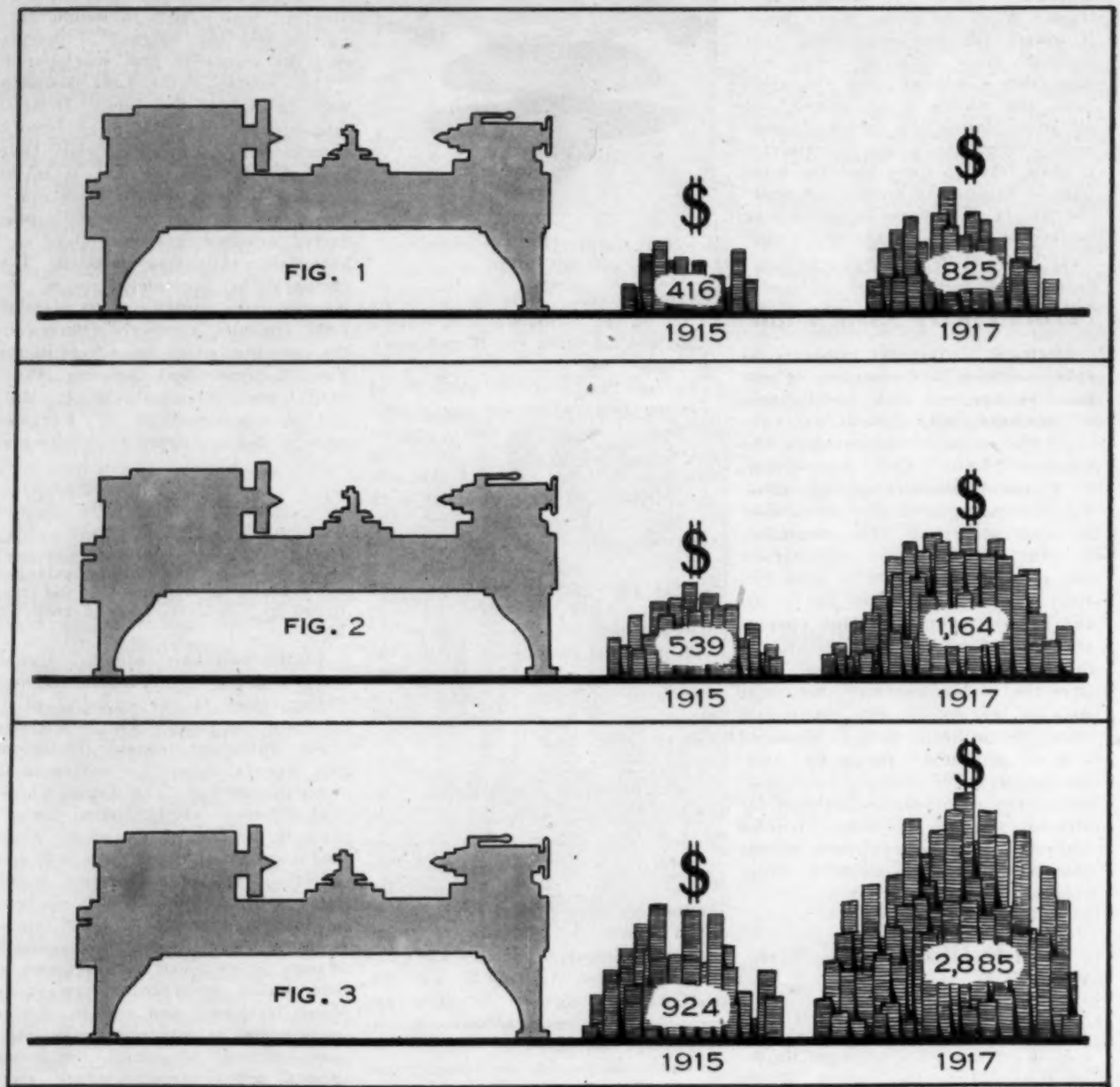
The crucible of the Lava company was developed by Louis DeBats, superintendent of the plant. Since importations of German clay have been shut off by the war, it is interesting to note that the Lava crucible is made entirely of domestic products, including graphite, clay, carborundum and binding materials. The company has completed plans for increasing the capacity of its plant to 2,000 crucibles a week. Officers of the company, which has offices in the First National Bank building, Pittsburgh, are: President, M. E. Moffett; vice president, M. W. Ray; secretary and treasurer, P. L. Berkey.

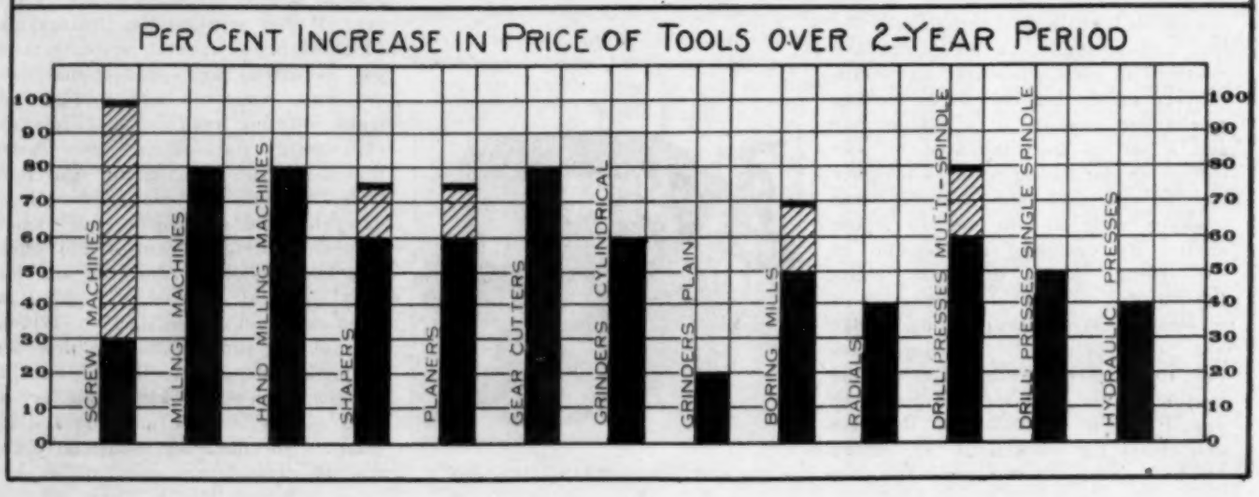
Book Review

Annual Chemical Directory of the United States, edited by B. F. Lovelace; cloth; 305 pages, 6 x 9 inches; published by Williams & Wilkins Co. and furnished by *The Iron Trade Review* for $5 net.

In the past two years the United States has been thrown on its own resources as far as chemical products are concerned. The progressive spirit which is pregnant throughout the chemical industry is evidenced in the publication of "The Annual Chemical Directory of the United States". This is the first edition of the book, and a review of its contents will give an idea of its value. Section I contains a list of the chemical products manufactured in the United States with the names of the manufacturers. Names of American manufacturers of and dealers in apparatus and equipment, machinery and mechanical supplies useful or essential for scientific and technical laboratories, industrial plants and organizations are given next. Other sections list professional chemical firms; federal, state, municipal, industrial and professional laboratories, American and foreign colleges, offering courses in chemistry; experiment stations in the United States and the principal foreign countries; federal and state officials of dairying, foods, drugs, etc.; American and foreign technical and scientific societies; also American and foreign chemical journals and important chemical books published in 1916-17. Chapter X summarizes the new and important happenings in the field of chemistry in 1916, while chapter XI tells of new devices, methods and appliances for handling industrial chemical problems.

A Comparison of Machine Tool Prices





How Tool Prices Have Skyrocketed

Contrary to Popular Theory the Machine Builders in the United States Failed to Feel War's Prosperity Upon Declaration of Hostilities—All Lines Have Advanced Heavily—Deliveries Big Problem

BY RALPH H. JONES

AUGUST, 1914, will long be remembered by machine tool dealers and builders. The market was at practically a standstill and the unusual period of depression preceding the declaration of hostilities in Europe, had seriously affected industrial conditions everywhere. Many concerns unable to cope with the financial reverses closed their plants. Some of their more fortunate competitors maintained appearances by operating on half schedules.

It is a fallacy to suppose the machine tool building industry profited hugely at the very outset of the war. As a matter of fact, conditions which were at low ebb prior to August 4, 1914, sank to even greater depths when the world went to arms. It was not until November, 1914, that the tool builders first sensed the true situation. Business increased rapidly. In December, 1914, war orders were coming into this country in an apparently never ending stream. Factories that first began to work overtime, later took on night shifts and finally adopted 24-hour schedules, operating three shifts. It was not until the period of high-speed production was fairly under way that price advances were made.

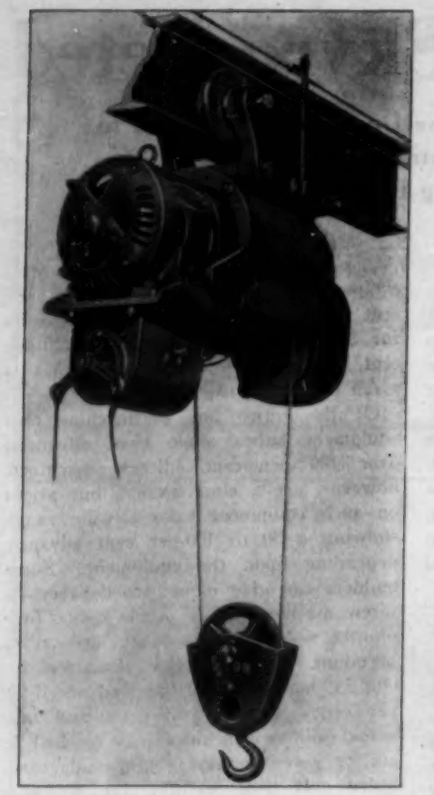
March, 1915, will long stand as a milestone in the machine tool industry. It marks the month of the first price advance. Machinery builders had already felt the insistent demands made by organized labor and in many cases had made substantial wage increases. Machinery users were quick to cry "robber", forgetting the extraction which they themselves were practicing on buyers and manufacturers of munitions. Raw material and labor, two of the most important factors in tool building, were increasing by leaps and bounds. It is unfortunate that the efforts of high-priced, unskilled labor is the only essential that apparently is missing when the finished tool stands on a sales floor. Good material is always evident upon close examination; skilled workmanship is unmistakable, and it is easy enough for the prospective purchasers to reconcile the increases due to these factors. High-priced raw material and unskilled labor are not as a rule recognized in the finished product. There is no question that many tool builders who spring up like mushrooms at the opening of the war order game, asked and were given outrageous prices for their products. Such concerns will perish early when the weeding out process begins. In fact, many companies incorporated for the express purpose of making shell-turning lathes have already sought relief from their toils at the hands of the legal headsman.

How Prices Trended Up

The charts shown on the opposite page indicate clearly the trend of machine tool prices since March 1, 1915. The three lathes shown respectively in Figs. 1, 2 and 3, are perhaps the most representative of that type of machine. Fig. 1 represents a general manufacturing lathe, a 14-inch x 6-foot, double back-geared tool, complete with regular equipment. March 1, 1915, this tool cost $416, today it cannot be purchased for less than $825, virtually a 100-per cent advance. One year ago this machine sold for $715 and deliveries could not be guaranteed in less than four months. Machines of this size may now be purchased for practically immediate delivery. This condition of the market affects nearly all lathes up to and including 26-inch swing machines. This situation is unusual in times when eight-month delivery clauses are being inserted in some contracts, but may be explained through the fact that practically every manufacturer in the country with facilities for building lathes has bent his efforts on producing this type of equipment. As a result of this wholesale specialization, a good supply of tools of this character has accumulated.

Also 18-inch x 8-foot tools suitable for making 3-inch shells, Fig. 2, may be had promptly. This type of tool has jumped from $539 in March, 1915, to $1,164 in April, 1917, a 120-per cent increase. Turning big naval shells demands a heavy tool. The machine commonly used for producing high-explosive or armor-piercing projectiles is a 30-inch x 10-foot heavy engine lathe, Fig. 3. A tremendous market was quickly developed for this type when foreign orders for heavy munitions were placed with American shell makers. In March, 1915, builders sold these tools for $924. A little over a year later, May, 1916, such equipment sold for $2,509, over 150-per cent increase. Today this machine sells for $2,885, an increase of over 210-per cent. Delivery on large-swing lathes is given at two to five months.

Of the entire line of machine tool equipment lathes alone have advanced over 100 per cent. Screw machines, however, are a close second, but prices on such equipment have a wide range showing a 30 to 100-per cent advance, depending upon the equipment. Some builders can give immediate delivery on screw machines while others quote four months. Milling machines are at a premium. Tools of this character, including hand millers, have advanced 80 per cent. Delivery on plain and universal milling machines may be had in six or seven months; hand millers require only four months for shipment from the manufacturer. Boring mill builders have increased prices from 50 to 70 per cent and deliveries are quoted anywhere from 12 to 25 months; planers have jumped 60 to 75 per cent with delivery in four to five months on sizes up to and including 42-inch machines; larger tools cannot be had, except in rare instances, in less than eight to 12 months. Shapers are scarce and expensive. They have increased from 60 to 75 per cent in two years and builders are quoting four to six months delivery; radial drills have jumped 40 per cent, with shipment in three to four months; single-spindle drill presses are spasmodic as delivery clauses read from 30 days to three months. In some cases such equipment may be had for immediate shipment; single spindle machines have advanced 50 per cent and multiple-spindle drills are up 60 to 80 per cent with delivery in 60 days. Cylindrical grinders cannot be had in less than four to six months and the price advance has been about 60 per cent; plain grinders are being shipped practically upon receipt of the order, or in from one to 10 days; the price advance of 20 per cent on these tools is the least on any shop equipment. Gear cutters for a time were unobtainable, but delivery may be had now in six to seven months; these machines have advanced 80 per cent in cost. Hydraulic presses are more or less special and delivery and price depend upon the equipment. An increase of 40 per cent has been made on this type of equipment and for the most part can be delivered in about 90 days.



ONE-HALF-TON HOIST

The machine tool builders today are in a better position to serve the needs of the federal government than at any time in the history of the industry. "Government business first" is the slogan of the big machinery interests and it is certain that every effort will be spent to make speedy delivery in the tools needed. It may take months for the delivery situation to return to its former status. Prices may not return to their old levels until foreign competition forces a revision, but when these changes are brought about they will find the American tool builder firmly intrenched behind a bulwark of confidence, capable and ready to meet the onslaught of his most belligerent competitors.

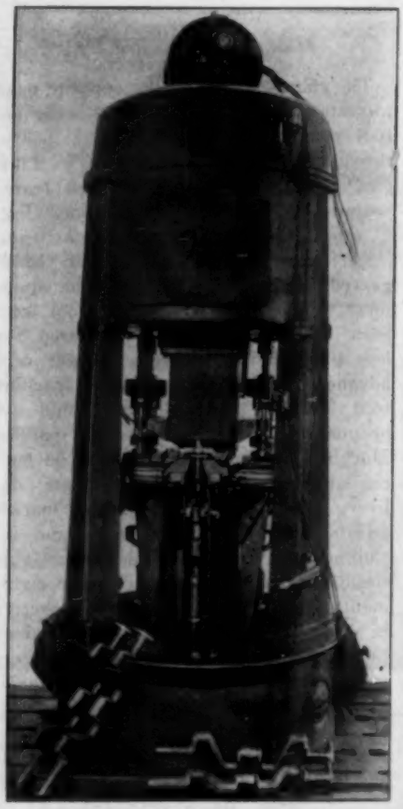
Offer Fellowships

Five fellowships for the year beginning July 1, 1917, are offered by the college of mines of the University of Washington in co-operation with the United States bureau of mines. The value of each fellowship is $720. It is possible for the holder to earn a master's degree in one year, the work being divided between research work in the experiment station in the bureau of mines and graduate study of the research subject in the University. The purpose of the fellowship is to undertake the selection of problems in mining and metallurgy which are of especial importance to the state of Washington, Alaska, and the Pacific northwest. It has been suggested that for the year 1917-1918 investigation be conducted on electro-metallurgical processes, beneficiation of coal and non-metallic minerals, clay industry and ceramics, general problems affecting the ores and the mining industry of Washington, and the development of metallurgical industries.

Develops Electric Hoist

The Barber-Foster Engineering Co., Swetland building, Cleveland, has recently developed a ½-ton electric hoist shown in the accompanying illustration. The hoist is equipped with motors and controllers constructed especially for heavy-duty service and are supplied with either direct or alternating current. A mechanical brake automatically stops and holds the load when the motor is stopped and releases only when the motor is started in the lowering direction. This brake is of the friction-disc type and is contained in the gear housing. Cut spur gears are used throughout. The trolley consists of two castings bolted to lugs on the frame. The hoist may be detached from the I-beam by removing these bolts. The wheels are single flanged with taper tread and are equipped with Hyatt roller bearings.

Designs Production Tool

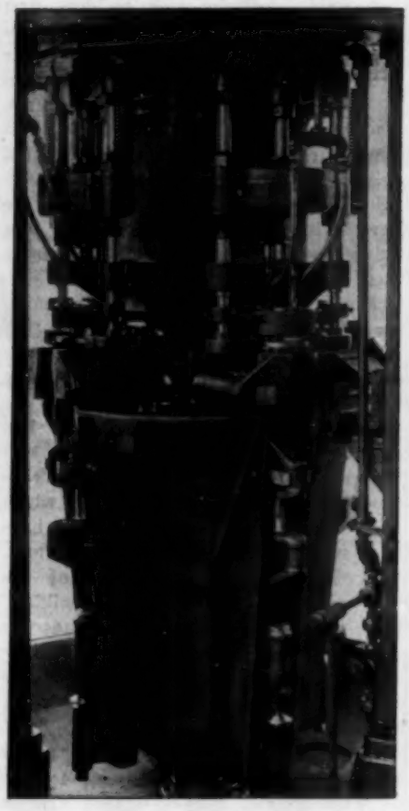


MACHINE FOR DRILLING AND REAMING CRANKSHAFTS

THE tremendous output of automobiles has made it necessary to group machining operations on all parts. Tools designed especially for high production have been built in large numbers and machining operations have been grouped for turning, facing, grinding, drilling and reaming. For the purpose of drilling and reaming six holes in the flange of crank shafts, the Baush Machine Tool Co., Springfield, Mass., has designed and built the machine shown in the accompanying illustration.

The tool is controlled by the Electric Controller & Mfg. Co.'s apparatus, and operated by a 5-horsepower Westinghouse motor, which is mounted on the top of machine. Below the motor controlling switch is a hand lever which controls the action of the heads.

The crank shafts are supported vertically on centers by means of fix-



MACHINE FOR DRILLING AND REAMING CRANKSHAFTS

tures. These fixtures are free to float universally in order to secure exact alignment with the heads after the table has been indexed. Flexible tools supply cutting oil to the tools.

The first operation consists of loading the crank shafts into the fixtures. In the second operation, two pin holes are drilled; reaming of these holes is done at the third index stop; four bolt holes are drilled in the flange at the fourth index. The builder states that one operator can complete the operations on a crank shaft in 50 seconds on this machine. The general specifications of this tool are as follows: Diameter of drills, 15/32-inch; speed, 202.6 revolutions per minute; feed, 0.0053-inch per revolution. Reamers, diameter, 0.441-inch; speed, 74.6 revolutions per minute; feeds, 0.0138-inch per revolution. Outside dimensions of machine, 4 x 10 feet; weight, 5,050 pounds.

The T. L. Smith Co., Milwaukee, engineer and machinist, specializing in contractors' equipment, is filling a repeat order for two of the largest concrete mixers ever built, for use in constructing a southern hydro-electric power plant. The mixers have a capacity of 108 cubic feet each. The largest machine previously built has a capacity of slightly over 50 cubic feet.

Erecting Overhead Motors

RECENTLY a number of concerns have been using a unique method of installing overhead motors. This method involves the use of a machine to elevate and hold the motor in place until it is attached to the ceiling. This device does away with scaffolding, special heavy platforms, blocks and falls and other hoisting arrangements which are ordinarily used for this purpose. The machine is also used for inspecting the motors, taking them down for repairs, repairing pulleys and for putting up shafting.

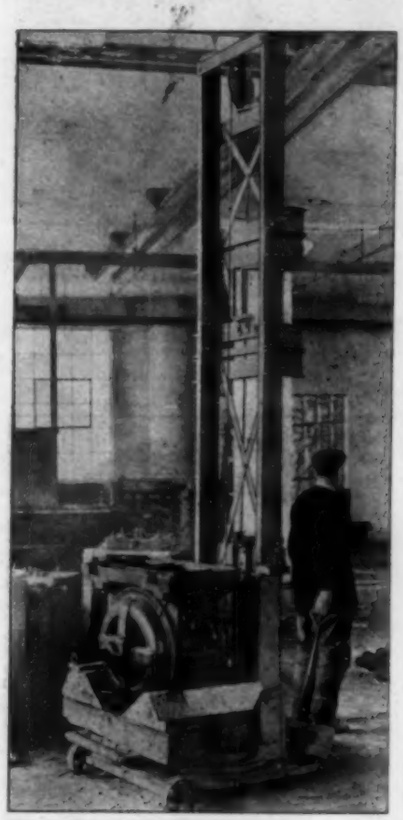


FIG. 1—PREPARING TO INSTALL A 30-HORSEPOWER MOTOR WEIGHING 1,400 POUNDS

FIG. 2—ELEVATING PLATFORM CARRYING MECHANIC AND MACHINE

The machine is built by the New York Revolving Portable Elevator Co., Jersey City, N. J., and is shown in the accompanying illustrations. It is essentially a portable elevator or tiering machine. It consists of two uprights or elevator guides, an elevating platform and a revolving base which can swing around on its ball bearing center like a turntable. The unit is mounted on truck wheels and is equipped with a floor lock. The motor to be raised is placed on the platform and by means of a crank and gears the platform is raised to the level desired. In elevating, the load is sustained independently of the crank. A ratchet is provided with a special pawl, which sustains the load at every point, eliminating all possibility of the platform being accidentally dropped. Two sets of gears are provided, one for high speed and one for low. Loads up to 800 pounds can be raised on the high gear and heavier loads by the low gear. The machines are from 6 to 20 feet high. All machines 7 feet and larger have the frame hinged so that the top section may be folded over to allow the machine to pass through doorways. Special machines are built for lifting loads up to 2,500 pounds. The standard type is built in two sizes, one for loads up to 800 pounds and the other for loads up to 1,800 pounds.

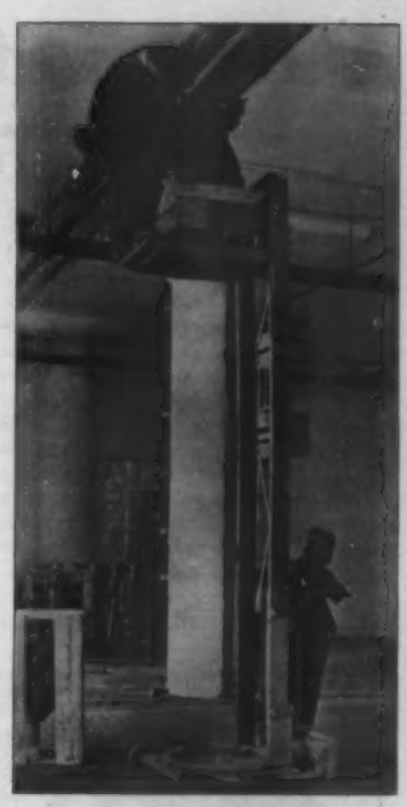


FIG. 3—MOTOR HELD IN POSITION WHILE BOLTS ARE APPLIED

The Steel Treating Research club of Detroit has acknowledged the receipt of an unsolicited contribution of $100 from Sir Robert Hadfield, of London, chairman of Hadfields, Ltd., and president of Faraday Society of England. He has also prepared a discussion of Harvard J. Stagg Jr.'s paper on impact tests.

A Study of Silica Refractories—II

The Second Installment Describing Tests Conducted on Silica Brick Deals With the Microscopic Study of Quartzites—Crushing Tests Give Interesting Data

BY J. SPOTTS McDOWELL

THE accompanying photomicrographs represent the microstructure of specimens of quartzite from the deposits most important in the American refractories industries. All of these quartzites consist essentially of individual quartz crystals of random orientation closely packed together and interlocking with sharp angles. No trace of a groundmass or binding material is to be seen, except in a few small and isolated areas, which do not appear in the figures. Small inclusions are visible in great number. The accessory minerals are extremely small in amount, and have not been studied.

Fig. 12 shows the Medina quartzite from Mount Union, Huntingdon county, Pa. This specimen consists essentially of a mass of interfering quartz crystals, each with a sand grain as a nucleus. The rounded or subangular outlines of the original sand grains are marked by a row of inclusions, and are perfectly distinct. The spaces between these are filled with secondary quartz which has attached itself to the original grains in crystalline continuity with them, so that the original quartz grain and the new quartz border have the same extinction positions and interference colors. The borders contain but few inclusions, and consequently are much clearer than the nuclei.

The Baraboo quartzite from Ablemans, Wis., is shown in Fig. 11. The grain is much coarser than that of the other quartzites examined, and the line along which the interlocking individuals join is peculiarly jagged. Many of the grains show a marked undulatory extinction with crossed nicols; that is, the whole of the crystal is not extinguished at the same time, but a wave-like shadow passes over it on rotating the stage. The crystals of the Alabama quartzite contain numerous inclusions, arranged in nearly parallel lines, which with low magnifications appear under the microscope as fine striations. The Anaconda quartzite is extremely fine in grain.

The textural relations described, and illustrated in the photomicrographs, do not sustain the conclusion that only quartzites containing a fine-grained groundmass or cement can be used in the manufacture of high-grade silica refractories. In Figs. 9, 10, 11, 12, quartz grains in extinction positions are shown by black areas; quartz grains in other positions appear as lighter areas. The small black dots are mostly inclusions.

The conditions under which the test brick were made were devised by the engineering department of the Harbison-Walker Refractories Co., Pittsburgh, for the purpose of studying the effects of variations in grind and temperature of burning, and of repeated burning, upon the physical

Second and last part of a paper presented at the February meeting of the American Institute of Mining Engineers.

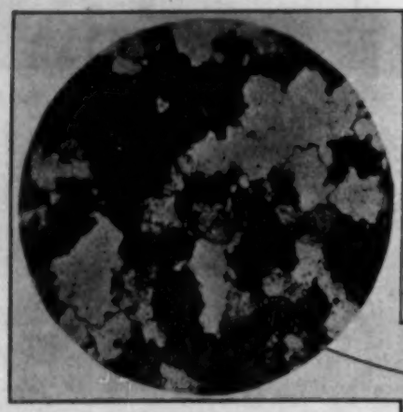


FIG. 9—QUARTZITE USED IN BRICK MAKING AT ANACONDA, MONT. FROM A SPECIMEN FURNISHED BY THE ANACONDA COPPER MINING CO. (WHITEHEAD)—CROSSED NICOLS
(Magnified 48 Diameters)

FIG. 11—BARABOO QUARTZITE FROM ABLEMAN'S, WIS. (WHITEHEAD) UNDULATORY EXTINCTION IS SHOWN BY A GRAIN NEAR THE CENTER AND BY ONE NEAR THE TOP OF THE SECTION—CROSSED NICOLS
(Magnified 48 Diameters)

FIG. 10—QUARTZITE FROM NORTHEASTERN ALABAMA, USED IN BRICK
(Magnified 48 Diameters)

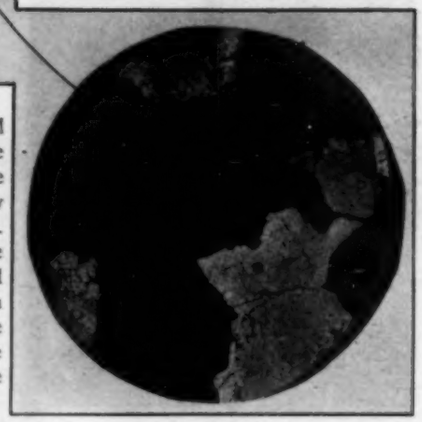


FIG. 12—MEDINA QUARTZITE FROM MT. UNION, HUNTINGDON COUNTY, PA.
(Magnified 48 Diameters)

properties and constitution of silica brick. Accordingly, three lots of 9-inch brick, approximately 9 x 4½ x 2½ inches, were made up. These lots will be referred to as "regular", "medium", and "fine grind" respectively. The regular-grind specimens were made by the usual method for 9-inch brick; those of medium grind were given the grind used for silica shapes, and pounded into loose-side molds, as silica shapes are treated. The material used for the fine grind was screened through an 8-mesh hand screen, returned to the pan and reground long enough to add and mix lime thoroughly; the brick were pounded into loose-side molds. Screen analyses are shown in Table XIV.

A number of brick from each lot were burned under the ordinary conditions of manufacture at three positions in the kiln, designated for convenience as positions *A*, *B* and *C*. The brick were burned a number of times, being under fire approximately 10 days each time, and specimens were

FIG. 13—SILICA BRICK OF REGULAR GRIND, BURNED ONCE AT CONE 15—(WHITEHEAD)—CROSSED NICOLS

The white areas represent residual quartz grains of irregular size and shape, surrounded by a dark field of cristobalite—Little, if any, tridymite is to be seen
(Magnified 120 Diameters)

set aside for study after each burning. The temperatures attained on the various burns as measured by Orton-Seger cones were shown in Table XI, page 934, of the last issue of *The Iron Trade Review*. The melting points in silica brick kilns probably average 70 degrees Cent. lower than the figures given by the manufacturers, but cannot be told with exactness, since cones give very erratic results when used in such kilns.

The apparent and approximate specific gravities and per cent of open pore space of certain brick of the first burn were shown in Table XII, page 934, of the last issue of *The Iron Trade Review*. The term "approximate specific gravity" does not indicate an

Table XIII

Thermal Conductivities

Material	Conductivity		
	Temperature		Mean k between k_1 and k_2
	t_1	t_2	
Silica brick, "Star" brand	0	100	0.0021
96.9 per cent. SiO_2	0	1,000	0.0031
Clay brick, "Woodland brand,	0	100	0.0016
52.9 per cent. SiO_2, 42.7 per cent. Al_2O_3	0	1,000	0.0025
"Quartzite" brick	0	100	0.0020
73.9 per cent. SiO_2, 22.9 per cent. Al_2O_3	0	1,000	0.0027
Silica brick, 96 per cent. SiO_2, specific gravity, 2.44	0	100	0.0028
	0	1,000	0.0031
Clay brick, 53.9 SiO_2, 40.2 Al_2O_3	0	100	0.0022
	0	1,000	0.0027

approximation of the true specific gravity, but is used in the particular sense defined earlier in this paper. The composition of the brick suggests that the value of the true specific gravity, of which no determinations were made, probably lies between 2.40 and 2.45. The per cent of open pore space was calculated from the two specific gravities.

From the figures given it appears that the greatest porosity is shown by the coarse (regular) grind, and the least by the medium (shape) grind. The data are insufficient to justify any conclusions as to the effect upon porosity of variations in burning temperature.

In the transverse tests the brick were laid edgewise with a span of 6 inches and the load applied at midspan. The modulus of rupture was calculated from the formula $R = \frac{3Wl}{2bd^2}$, in which l is the distance between supports in inches, b the breadth and d the depth of the specimen in inches, and W the load in pounds at which failure occurred.

FIG. 14—SILICA BRICK OF FINE GRIND, BURNED ONCE AT CONE 15—(WHITEHEAD)—CROSSED NICOLS

The figure shows residual quartz grains surrounded by cristobalite—There are a few narrow, elongated white areas in the field, which may represent tridymite
(Magnified 120 Diameters)

Compression tests were made on half bricks resulting from the transverse tests. The bricks were bedded flatwise on blotting paper in the testing machine to secure a uniform bearing surface. The crushing strength was obtained by dividing the crushing load in pounds by the mean area in square inches of the two surfaces of the brick. Unfortunately, but three brick of each lot were available for these tests, a number insufficient to permit the determination of the mean strengths with the proper degree of accuracy. The proposed specifications of the American Society for Testing Materials direct that at least five specimens shall be used in transverse and compression tests upon building brick, and the same requirements should undoubtedly apply to the testing of refractory brick.

It is highly desirable not only that the brick should be mechanically strong, but also that different specimens of the same lot should be of uniform strength. For this reason in Table XV obviously the lot of

FIG. 15—SILICA BRICK OF REGULAR GRIND, BURNED THREE TIMES AT CONE 15 — (WHITEHEAD)—CROSSED NICOLS

Tridymite and residual quartz are shown by the white areas; cristobalite by the dark areas
(Magnified 120 Diameters)

brick of "regular grind, mark C-3," is a more satisfactory material, so far as cross-breaking is concerned, than the "fine grind, mark A-2," notwithstanding the fact that the mean modulus of rupture of the former is 1,110 pounds per square inch, of the latter, 1,270 pounds per square inch. Since mean values in themselves are insufficient as a basis of comparison for the strength of such brick, the average deviation of the single observations from the mean (as developed in the principles of precision of measurements) has been calculated as a measure of uniformity of the different specimens, for each lot of brick tested. That such an application can properly be made of the average devi-

Table XIV

Screen Analyses of Test Brick

Grind	Screen Numbers in Meshes per Linear Inch					
	Held on					Through
	8, Per Cent.	16, Per Cent.	20, Per Cent.	30, Per Cent.	40, Per Cent.	40, Per Cent.
Regular	15.3	13.4	4.6	5.4	4.8	56.5
Medium of shape	10.2	13.1	2.2	5.0	4.7	64.8
Fine		14.3	4.1	6.5	4.1	71.0

ation is urged for a number of reasons. The deviation of single observations from the mean is due to lack of precision of the measurements; and lack of uniformity of different specimens of the material. In the series of tests made, variations due to the former factor amount to less than 2 per cent and are practically negligible as compared with variation due to the latter. For this reason, the average deviation can be considered a true measure of uniformity. A very low average deviation is an indication of a high degree of concordance in the values found for different specimens of the same material. A high average deviation indicates a lack of concordance.

Effect of Variation in Manufacture

The mean modulus of rupture of medium-grind brick is greatest; of regular-grind, least. The burning temperatures which produce the strongest brick in cross-breaking are as follows:

	First burn	Second burn
Regular-grind	Cone 15	Cone 15
Medium-grind	Cone 15	Cone 14 and 15
Fine-grind	Cone 15	Cone 14

Bricks of regular grind increase in cross-breaking strength after each burning. After the first burn, specimens at cone 15 are considerably stronger than those burned at cone 13 or 14; after the second burn this is no longer true. Modulus of rupture of medium and fine-grind brick, in most cases, reaches a maximum on the second burn. Crushing strengths of regular, medium and fine-grind brick are to each other approximately as 41:84:100. There is an increase in strength after each burn; a slight increase for regular grind, a considerable increase for medium and fine grinds. Uniformity of strength of a given lot of brick diminishes with repeated burning; slightly in compression, considerably in cross-breaking. The most uniform brick are those of regular grind; fine-grind brick are fairly uniform in crushing, very non-uniform in cross-breaking strength. The figures indicate that the medium-grind brick is the most

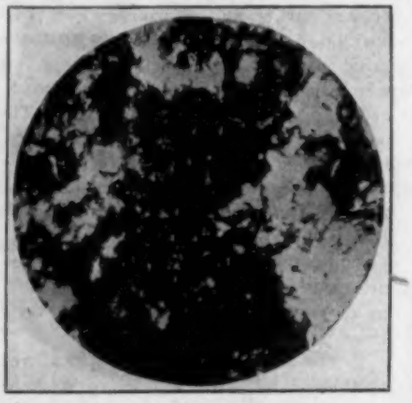


FIG. 16—SILICA BRICK OF REGULAR GRIND, BURNED THREE TIMES AT CONE 15—(WHITEHEAD) —CROSSED NICOLS

The larger white areas indicate places in which the conversion to tridymite is nearly complete—The smaller white areas in the darker portion of the field represent residual quartz and tridymite, surrounded by cristobalite, shown in black—Figs. 15 and 16 are taken from different parts of the same thin section

satisfactory in point of strength, the regular-grind least so. While the compressive strength of the medium-grind is somewhat lower than that of the fine-grind, its cross-breaking strength is greater and it is a much more uniform material. In cross-breaking, the fine-grind shows little if any advantage over the regular grind, for while its mean strength is high, it lacks uniformity; in compression, it is far stronger than the regular-grind. There is, in all cases, an advantage in burning the brick a second time. For the medium and fine grinds, a third burn is usually harmful, decreasing the cross-breaking strength considerably, and increasing the compressive strength very slightly. Brick of regular grind increase in strength on each burn up to the third, slightly in compression, considerably in cross-breaking. The alternate expansions and contractions incurred in repeated burning may tend to cause the formation of minute cracks in the brick and to have an unfavorable effect upon their strength. For that reason it is probable that stronger brick would be produced by maintaining the maximum temperature a greater length of time during a single burn than by resorting to repeated burning.

Method of Microscopic Study

Quantitative determinations of the proportions of quartz, tridymite and cristobalite in specimens of the various lots of brick were made by the Rosiwal micrometric method. The measurements were all made upon powdered material, the minerals being identified through comparison of indices of refraction by immersion in liquids of definite indices. The Zeiss mechanical stage, and a lens system giving a magnification of about 390 diameters, were used. The indices of refraction of quartz are 1.544 to 1.533; cristobalite, 1.484 to 1.487; tridymite, 1.469 to 1.473; calcium silicates are higher than those of quartz. Separate portions of each powder were studied in two liquids whose indices of refraction were respectively 1.495

Table XV

Method of Deriving Average Deviation

Grind	Mark	Modulus of Rupture	Mean Modulus	Deviation from Mean	Average Deviation or "a.d."	a.d. in Per Cent. of Mean
Fine	824-A-2	680		590		
Fine	848-A-2	770		500		
Fine	850-A-2	1,950	1,270	680	540	43.0
Fine	970-A-2	1,670		400		
Regular	66-C-3	1,170		60		
Regular	153-C-3	1,160	1,110	50	80	7.2
Regular	179-C-3	990		120		

and 1.497. The higher-refracting quartz and compounds not identified were distinguished in the former liquid from the lower-refracting cristobalite and tridymite. Nearly all of the higher-refracting material had the refractive index and general properties of quartz. Fragments of other materials were infrequently recognizable. The proportion of tridymite was determined by immersion of the powder in a liquid with refractive index of 1.479, which is between those of tridymite and cristobalite, but extremely close to them. On account of the latter fact, variations in room temperature caused some difficulty; since the index of the liquid was diminished 0.0005 to 0.0006 for each degree temperature rise. All material with an index lower than 1.479 was reported as tridymite, and the amount of cristobalite obtained by difference.

A sample of about 300 grams from each lot of test specimens, 100 grams from each brick of the lot, was crushed in a small Blake crusher and a disk grinder, to pieces approximately 1/16 inch in diameter. After cutting down to 20 grams with a split shovel, the sample was reground until all passed through a 140-mesh sieve. For the microscopic study, that fraction was reserved which passed through a 240-mesh and was caught on a 260-mesh sieve. The size of these grains as determined microscopically varied from 0.05 to 0.06 millimeter in diameter.

The principal optical property used in identifying the minerals was the index of refraction, by means of the Becke effect. The single grains were commonly made up of two, sometimes all three minerals, and the correct positions of the boundaries between tridymite and cristobalite could be told only by crossing the nicols and rotating the stage. The more highly refracting material, chiefly quartz, was easily recognized by its high relief in the liquid used, and by well-defined Becke lines. Tridymite was distinguished by its low index, low double refraction, and by the lath-shaped and wedge-shaped outlines of its crystals. Identification was confirmed by the facts that the lath-shaped sections had parallel extinction and negative elongation, and that the index of refraction of the faster ray, as determined by the immersion method in sodium light, was 1.469. The low relief, the index of refraction, and the extremely low double refraction, which could usually be detected only with the aid of the sensitive time plate, served to identify cristobalite. In the liquid with index 1.479, the Becke lines were faint, but their directions of motion could be detected upon close observation so long as the room temperature was kept at the proper point. The lack of homogeneity of the grains led to the introduction of certain unavoidable quantitative errors. Quartz could, as a rule, be recognized even on the interior of the grains by the clearness of the Becke lines and the high relief; yet numerous small particles of residual quartz were often so mingled with the cristobalite that an accurate quantitative separation of the two was impossible. The double refraction of tridymite was the only means of determining with exactness the boundaries between tridymite and cristobalite, but in sections of certain orientation could not be used.

A coarser powder than that used was found to give less accurate results. The very fine portion, which went through the 260-mesh sieve, was exceedingly difficult to study. Since the latter fraction comprised about 85 per cent of the original powder, it is evident that any great variation in its composition from that of the study sample will very seriously affect the results. For that reason, check determinations were made in a few cases of the amount of quartz in both the fraction which had passed through the 260-mesh sieve, and that which had been caught upon it. Results so obtained averaged 2 per cent lower in the former case than in the latter, a difference which lies within the error of observation. Errors introduced into the tridymite determinations by discarding the very fine material are probably serious, yet it

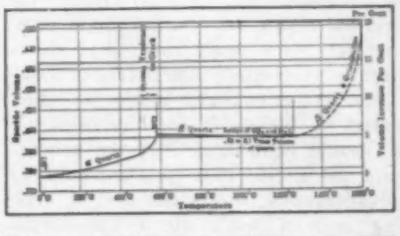


FIG. 17—SPECIFIC VOLUMES OF THE SILICA MINERALS AND QUARTZ GLASS

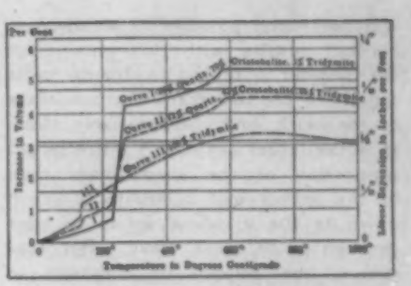


FIG. 18 — THEORETICAL EXPANSION CURVES FOR MIXTURES OF THE SILICA MINERALS

Composition of Curve 1 corresponds closely to brick of regular grind burned once at cone 14. Composition of Curve 11 corresponds closely to brick of regular grind burned six times at cone 14-14-15-14-15-14.

Table XVI

Results of Microscopic Study

Lot	Mark	Grind	Burned to Cone	Number of Burns	Constitution in Per Cent. by Volume		
					n 1.495	n 1.479	n 1.479, 1. 495
					Quartz (+Silicates)	Tridymite	Cristobalite
A-1	277, 279	Regular	15	1	26	4	70
C-1	102, 156	Regular	14	1	25	4	71
B-1	135	Regular	13	1	40	1	59
A-1	715, 730	Medium	15	1	24	6	70
A-1	1,150, 1,151	Fine	15	1	26	4	70
C-1	934, 1,052	Fine	14	1	26	5	69
A-2	275, 288, 290, 293	Regular	15-15	2	19		
A-3	39, 53, 144, 249	Regular	15-15-15	3	16	19	65
C-3	66, 153, 179	Regular	14-14-15	3	14	20	64
B-3	174, 202, 280	Regular	13-15-15	3	15	10	
A-3	427, 428, 439, 501	Medium	15-15-15	3	13	17	70
A-3	1,028, 1,066, 1,057, 1,046	Fine	15-15-15	3	13	17	70
C-4	12	Regular	14-14 15-14	4	12	30	58
C-6*	74	Regular	14-14-15 14-15-14	6	14	44	42
B-6*	326	Regular	13-13-15 14-15-14	6	12	45	43

was not found possible to obtain concordant results with this portion of the powder. Tridymite forms most rapidly in the fine-grained groundmass of the brick, and comparatively slowly in the larger grains. A much larger proportion of the groundmass than of the grains will undoubtedly crush down in the grinding so as to pass through a 260-mesh sieve. For that reason, the amount of tridymite in the fraction of the powder reserved for study, is probably considerably less than in the brick itself.

The figures given as the proportions of quartz and tridymite in the test brick represent in each case results of measurements taken on 150 to 250 grains. As a check on the work, percentages were calculated for each 75 to 80 grains. The first two results usually agreed within 3 to 4 per cent; if not, an additional 80 to 100 grains were studied.

Effect of the Addition of Lime

It has been shown that fineness of grind is not the controlling factor in the formation of tridymite, since that mineral evidently forms nearly as rapidly in the brick of coarse, or regular, grind, as in those of finer grinds. A seeming contradiction exists between this fact and the fact that the inversion to tridymite takes place more rapidly in the fine-grained groundmass of the brick than in the larger quartzite fragments.

The relative concentrations of lime in the groundmass of brick of various grinds probably has some bearing in this connection. It will be recalled that in the manufacture of the brick, 2 per cent of lime is added to ground quartzite containing about 2 per cent of impurities, mainly Al_2O_3 and Fe_2O_3. Since all of this enters the groundmass, the proportion of lime therein is much higher than 2 per cent. The greatest concentration of lime in the groundmass will occur in that brick with the least proportion of fines, in which, therefore, conditions will be most favorable for the formation of flux compounds during the burning. The catalytic action of the flux compounds probably explains the observed inversion of cristobalite to tridymite, which does not form except in the presence of a flux. According to this point of view, an increase in the amount of lime in the brick should accelerate the formation of tridymite.

The permanent expansion of silica brick after the first burning, in which 5 per cent of tridymite and 70 per cent of cristobalite are formed, amounts to 10 to 11 per cent by volume. The gradual decrease of quartz and increase of tridymite caused by repeated burning, theoretically requires a slight additional expansion after each burn until equilibrium is reached, since the complete transformation of quartz to cristobalite is accompanied by a volume increase of 13.6 per cent quartz to tridymite, 16.8 per cent.

At 1,250 degrees Cent. the specific volumes of cristobalite and tridymite are approximately 14 to 15 per cent greater than that of quartz. Since the residual quartz of silica brick gradually goes over into the other forms of silica at furnace temperatures, an underburned brick will expand considerably after being placed in use. Tridymite expands upon heating much less than does cristobalite. Its specific volume at 20 degrees Cent. is 2.8 per cent greater than that of cristobalite; at 1,000 degrees Cent., nearly the same as that of cristobalite.

From the data of Fig. 17, specific volumes at different temperatures were computed for two materials assumed to consist of mixtures of quartz tridymite, and cristobalite; expansion curves derived from these figures are shown in curves I and II, Fig. 18. Curve I is based upon an assumed composition of 25 per cent quartz, 70 per cent cristobalite, 5 per cent tridymite. Curve II is based on one of 12 per cent quartz, 43 per cent cristobalite, 42 per cent tridymite. These figures represent approximately the compositions of brick of regular grind, after one and after six burnings, respectively. Curve III is taken from the expansion data of Le Chatelier, who has made an exhaustive study of this subject.

Fig. 18 indicates the probable character of the expansion curve of silica brick, and the effect upon the same of the observed changes in constitution. Obviously, the theoretical curves shown will not correspond precisely with those that would be obtained by actual measurements, being affected by inaccuracies in the data from which they were computed, and, in addition, modified by changes in porosity of the brick, the action of flux compounds, and the lag in expansion due to the temperature gradient between the exterior and interior of the brick. These curves indicate that the temporary or thermal expansion of silica brick is decreased by repeated burning, and that an all-tridymite brick would have an expansion amounting to about 60 per cent of that of an ordinary commercial brick, as represented in Curve I.

It is well known that silica brick crack or spall badly if subjected to rapid temperature changes. The phenomenon is probably due chiefly to the rapid expansion at 230 degrees Cent. to 270 degrees Cent., accompanying the *a* and *B* cristobalite inversion. This effect is diminished by repeated burning. The calculated volume increase at 230 degrees Cent. to 270 degrees Cent. amounts to 3.5 per cent for brick burned once, 2 per cent for brick burned six times. An all-tridymite brick should show very little tendency to crack upon rapid heating or cooling, since the only sharp break in the tridymite expansion curve, occurring at 130 degrees Cent., is attended by a volume increase of but 0.3 per cent.

Effect of Repeated Burning

Comparison of curves I and II seems to show that, while repeated burning produces very desirable effects, the advantages derived up to the sixth burn are entirely disproportional to the additional expense involved, on account of the extreme slowness with which tridymite is formed. Moreover, if used continuously at a temperature exceeding 1,470 degrees Cent., a tridymite brick would slowly revert to cristobalite. Since the time element appears to be the most important factor in the formation of tridymite, it appears that long-continued burning at the proper temperatures should be more satisfactory than repeated burning. The maximum temperature is maintained 40 hours in the burning of silica brick. Maintaining this temperature for 2½ weeks should presumably give rise to the same changes in constitution as 10 separate burnings under the ordinary conditions of manufacture, and produce brick consisting almost wholly of tridymite.

In order to make a brick containing the maximum proportion of tridymite, the burning temperature should be that at which the inversion to that mineral proceeds most rapidly. This must occur below 1,470 degrees Cent., since tridymite is not known to form under any conditions above that point. While the inversion proceeds more rapidly at cones 14 and 15 than at cone 13, no conclusions can be drawn from the data herein given as to the most favorable temperature for burning. It seems desirable that the theoretical advantages of a high-tridymite brick should be investigated by comparing the thermal expansion of an ordinary commercial brick with that of a brick high in tridymite. The effect of rapid temperature changes might be compared by means of spalling tests. If it should be proven that the production of a tridymite brick would be advantageous, the possibility of making such a brick on a commercial basis for certain purposes might well be considered. A small furnace, in

which close temperature regulation is possible, should preferably be employed, and the results thereby obtained, if promising, should later be tried out on a larger scale. The temperature at which the formation of tridymite proceeds most rapidly in silica brick, and the inversion-velocity at that temperature, are as yet undetermined. The possibility of accelerating the inversion by a slight increase in the amount of lime used or by the addition of some other catalyzing material, is worth considering. It is not impossible that by long-continued heating at the proper temperature, with possibly a slight additional amount of lime, a tridymite brick might be produced on a commercial basis. The results of tests so far made, however, indicate that this is extremely doubtful.

Institute Program

For May Meeting Being Arranged—Several Important Papers

Preliminary arrangements have been made for the papers to be read at the spring meeting of the American Iron and Steel Institute, which will be held in New York City, May 25 and 26. In addition to the customary presidential address by Judge Gary, the following papers will be presented:

"Chemical Reactions in the Blast Furnace," by Walther Mathesius, assistant superintendent of blast furnaces, South Works, Illinois Steel Co., Chicago; "The Manufacture of Steel Castings," by R. P. Lamont, president, American Steel Foundries, Chicago; "Forming of Steel by Presses, Hammers and Rolling," by John Lyman Cox; and "Turbo-Blowers vs. Reciprocating Steam Engines for Blast Furnaces," by R. H. Rice, engineer, General Electric Co., Lynn, Mass. William O'Neill Sherman, chief surgeon, Carnegie Steel Co., Pittsburgh, also will present a paper.

Americans to Appear on Institute Program

The annual meeting of the Iron & Steel Institute will be held in London May 3 and 4. Apart from the usual formal business, the most interesting matter will be the adoption of a new by-law authorizing the Council to suspend or remove from the list of members any member for willful controversion of by-laws or for any other sufficient reason. The bessemer medal for 1917 is to be presented to Andrew Lamberton, vice president. An unusual feature of the program is the fact that only two of the eight papers are contributed by British members, and both of these come from Sheffield. J. N. Kilby will contribute a paper on "Steel Ingot Defects", and F. C. Thompson one on "Influence of Surface Tension on the Properties of Metals, Especially of Iron and Steel". Two papers are assigned to America, one by F. C. Langenberg, of Harvard, on "Cementation by Gas Under Pressure", and the other by C. P. Raidabaugh, of Sparrows Point, on "Origin and Development of the Railway Rail". Two papers are to be presented by Russian members.

Acquires Control

Of Kittanning Blast Furnace Plant and Puddling Works

Controlling interest in properties of the Kittanning Iron & Steel Mfg. Co., Kittanning, Pa., including a blast furnace and an iron mill, have been purchased by Charles McKnight, president of the Western National Bank of Pittsburgh and the Carbon Steel Co., and treasurer of the Pittsburgh Iron & Steel Foundries, Pittsburgh, with works at Midland, Pa. Mr. McKnight, for the present, will operate the Kittanning furnace and mill as an individual. The sale of the Kittanning properties was effected by Thomas R. Heyward Jr., and Frank B. Foster, both of Pittsburgh. The Rebecca blast furnace of the Kittanning company was built in 1906, and consists of a stack 80 x 18 feet, four McClure stoves, blowing engine, six water tube boilers, casting machine and machine shop. The annual capacity is 100,000 tons. The company owns 32 puddling furnaces, a heating furnace and a muck mill, the latter with an annual capacity of 20,000 tons. The company also owns 800 acres of gas property in Armstrong county, Pa. F. C. Neale, Farmers Bank building, Pittsburgh, has been president and general sales manager of the company. The Carbon Steel Co. and the Pittsburgh Iron & Steel Foundries Co. have open market buyers of iron. An ingot mold plant at Midland may be transferred to Kittanning.

To Build Engines

O. O. Storle, Kewaunee, Wis., designer of several new types of internal combustion engines, is arranging to establish a large machine shop, to which a foundry will be added later. Mr. Storle has organized the Storle Engine Co., with $50,000 capital, the officers of which are: President, O. O. Storle; vice president, O. L. Pierpont; secretary and treasurer, H. O. Granberg; general superintendent, Wenzel Heck.

Government Needs

In High Explosive Coal Tar Products Control Selling.

New York, May 1.—Further contracting of toluol and benzol is expected to develop shortly as a result of additional government requirements. Since the placing of the recent large contracts for trinitrotoluol, which in turn led to heavy buying of toluol, the government has manifested interest in further supplies. Because of this situation, makers are hesitating in closing additional contracts, particularly for toluol, and to some extent for benzol. It is pointed out that while toluol supplies are scarce, a number of large contracts are due to expire soon, and these will not be renewed until definite word has been given as to what will be wanted by the government. Toluol has been quiet the past week but in benzol there has been comparatively active buying both for spot and contract.

Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.75 to 2.00
Solvent naphtha	.18 to .25

Per Pound at Producers Plant.

Phenol	$0.45

Per 100 Pounds at Seaboard.

Sulphate of ammonia	$4.70 to 4.80

Contract.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.50 to 1.75
Solvent naphtha	.18 to .22

Per Pound at Producers Plant.

Phenol (nominal)	$0.45

Per 100 Pounds at Seaboard.

Sulphate of ammonia	no market

Stocks of benzol while still adequate to meet current demands, are small. Pure benzol continues to be quoted at 55 to 60 cents per gallon, at producer's plant, both spot and contract and toluol at $1.75 to $2 per gallon, for spot and at $1.50 to $1.75 for contract.

Demand for phenol has been quiet and has been concentrated almost entirely in spot. This product continues to be quoted at 42 to 45, per pound, at producer's plant, for spot and nominally at 45 cents for contract. Solvent naphtha continues weak. Numerous new uses for this product are being developed, with the result that sales steadily are increasing. Quotations are at 18 to 25 cents per gallon, at producer's plant, for spot and at 18 to 22 cents for contract. Demand for sulphate of ammonia, following brisk buying by fertilizer manufacturers preparing to co-operate to produce increased food supplies, now is rather quiet. Supplies are small. Sulphate of ammonia continues at $4.70 to $4.80, per 100 pounds, at seaboard, for spot. The contract market has not yet been established.

Must Maintain Industrial Strength

Imperative Necessity of Preserving Nation's Productive Efficiency in War Time by Systematic Effort of Manufacturers and Faithful Co-operation of Labor Sounded by National Metal Trades—Plants Offered to Government

UNANIMOUS expression of a determination to assist the government in every way possible to win the war; of a willingness to allow pending labor questions to lapse for adjustment until after the war, and of the imperative necessity of keeping skilled mechanics at work in the manufacturing plants of the country instead of having them enlist for military service, was set forth in a spirit of positive and constructive patriotism at the nineteenth annual convention of the National Metal Trades Association held at the Hotel Astor, New York, April 25 and 26. A resolution was adopted submitting for the disposal of the government the plants of the members of the association, to the end that "warfare between civilized nations be wiped out forever". The association also unanimously recorded its opinion that the army bill, including the selective draft feature should be passed immediately and that failure to include this latter section of the bill would result detrimentally to the country at large in its preparation to meet the present critical situation. The membership committee reported a net gain of about 30 members during the year and stated that the number of operatives employed by the membership was greater than ever before in history. The attendance was larger than any previous convention, registering over 400.

PRESIDENT W. H. Van Dervoort in his annual report impressed upon his hearers the necessity for maximum production of needed materials during the crisis the country now is entering upon, and that the present is no time to talk of reducing output by shortening hours. He said in part:

"We have just passed through the most eventful two years in our history. At the beginning of this period business was dull and many men out of work; then almost without a moment's notice, business boomed and employers were making frantic efforts to secure workmen, first skilled mechanics and then common labor. Following the law of supply and demand, wages began to go up. Labor became restless. Manufacturers producing their regular lines lost their mechanics by the thousands, to firms operating on the more profitable war orders. Thousands of men were diverted from their regular vocations. The farms were stripped of their help, the mills, the mines and the factories producing the necessities of life have been sorely pressed. With the European labor market practically shut off, we face in this country today a serious shortage of labor and, as evidenced by the rapidly rising prices, a shortage of foodstuffs, and this as we enter the world war which promises to draw still more heavily on our manufacturing and agricultural resources. Through all this abnormal period, labor unions have been pressing their demands for the 8-hour workday, fully recognizing the impossibility of producing what is required on any such working basis.

"We desire that during the war labor be given no advantage over us. We desire that the situation be allowed to remain in 'statu quo' in order that we may best serve from the standpoint of efficiency, economy, and our future welfare, the needs of our nation, and to that end I suggest that our members in considering government work, protest against labor restrictions. We must, however, remember that we are at war, and whatever our feeling against the 8-hour restrictions, we cannot honorably decline to serve our government in the present situation. Let us use every effort to produce that which is required under our existing factory economic systems. Failing, however, to get satisfactory recognition of what we consider just and equitable, let us then put ourselves to the task, producing what is required as best we can."

System is Crying Need

Of what use, indeed, are millions of men if they are untrained and uninstructed; of what use are guns on land or sea if we have not enough qualified machine shop capacity to supply ammunition; of what use are foodstuffs and clothing and supplies of all kinds if they cannot be purchased and delivered quickly to the armies and navies which need them; of what use is vast national wealth if it cannot be used systematically for things needful; of what use are great transportation systems without adequate rolling stock or terminal facilities, or centralized executive direction? We have been like the sailor in a small boat in mid-ocean surrounded by miles of water and not a drop to drink, like the traveler in the desert who sees all the glory of the mirage and without realizing it is only a picture of what might be.—A. L. Humphrey, of Westinghouse Air Brake Co.

That the 8-hour workday movement has not made perceptible progress in the metal trades, despite all the strikes and agitation of the past two years, is indicated by a compilation submitted by Secretary Homer D. Sayre. This report showed 54.8 per cent of the members of the association are operating their plants 54 to 55 hours per week; 14.7 per cent are working over 55 hours per week; 27.4 per cent are working less than 54 hours, but more than 48 hours per week; only 3.1 per cent of the members are operating their plants 48 hours a week, while none at all is on a straight 8-hour day basis.

In the absence of Howard E. Coffin, President Van Dervoort outlined the important work which now is being done by the council of national defense. Mr. Van Dervoort explained how the council is co-operating with the army and navy departments in the formulation of standards and the distribution of work along lines best calculated to permit manufacturers throughout the country to produce with the least amount of lost motion, the materials which the United States and its allies now will require on an unprecedented scale in prosecuting the war to a victorious conclusion. When the work of placing requirements for the United States government began to be outlined, said Mr. Van Dervoort, everybody was willing to do his maximum, but that there was a lack of co-ordinated information. Many companies were found to have so much work on their books that government needs, if taken care of in the order in which they were booked, would not by ready for delivery for indefinite periods. This difficulty was overcome by having the plants best able to make certain

equipment for the government, turn over a large portion of their regular commercial contracts to competitors, thus leaving them free to concentrate advantageously on the government contracts. By this policy, guns and other war materials, which otherwise could not have been obtained for two or three years, now promise to be delivered without delay. This policy of co-operation will continue to be pursued to an increasing extent, Mr. Van Dervoort said, with the likelihood that it will take far less time to establish the country on a war footing than even a few weeks ago was thought possible.

A. L. Humphrey, of the Westinghouse Air Brake Co., Pittsburgh, read an interesting paper on the mobilization of our industrial resources, pointing out the paramount influence of keeping the army at the front abundantly supplied with munitions of war. He emphasized the necessity of retaining skilled mechanics in the plants, instead of allowing them to go to the front. He drew upon the store of experience he has acquired in munition work for foreign belligerents and explained in detail some of the problems confronting this country.

"Had England been one-tenth as well prepared on land as she was on sea, this war, according to the best military experts, would have been of much shorter duration," said Mr. Humphrey. "Like ourselves, England trusted to her resources, and when the fatal blow came she had to pay dearly in life and property for what could have been well provided for in times of peace. Her experiences have taught her that modern warfare demands the closest co-operation of all economic elements in a nation, and moreover, that the people must be brought to realize, by means of a just, efficient and successful government, that they have a country and national institutions worth fighting for and making sacrifices for.

"The United States in its former condition could hardly be regarded as a cohesive nation. We have been too inclined to be selfish and unless we learn to subordinate our individual selfishness to a general recognition of broad public rights and needs we cannot hope for the most effective co-operation in time of war.

Nation is Youthful

"As a nation we are yet young and childish and immature in many of our judgments. We are self-confident and physically exuberant and strong. We have looked back upon our brief history with eyes and minds that tend to enlarge upon our national accomplishments. We have not looked forward enough to realize that war is no longer a question of men and resources or even money; but of a vast complex system of organization, shops and mills, and every industry of all skilled labor, of all executive intelligence, of all financial foresight and acumen; in short, of ability to make use, and effective use, of these resources and in the minimum of time.

"But a great process of education is now in progress. Europe is teaching us graphically—by moving pictures, as it were—what war in all its phases means today, and how ill-prepared we are to meet any such terrible stress.

"May our country in this world's peril lead in national efficiency, pride and greatness; may every man become a citizen for service to his country; be that service hard or easy, as it may. Let us teach thrift and economy in natural resources. Let us strive for perfection in the useful arts and sciences. Let us teach the dignity of labor, the rights of capital, and the folly of internal contentions and struggles which only waste and weaken. Let us teach intelligence and sound judgment to all the people, and then will the nation realize that great resources do not necessarily mean strength, but only when the whole process of bringing these resources to utility quickly has been evolved."

W. H. VANDERVOORT
Re-elected President of the National Metal Trades Association and Actively Associated with the Preparedness Movement

New Officers

President:— W. H. Vandervoort, Root & Vandervoort Engineering Co., East Moline, Ill.

First vice president:—Murray Shipley, Lodge & Shipley Machine Tool Co., Cincinnati, O.

Second vice president:—H. W. Hoyt, Great Lakes Engineering Works, Detroit.

Treasurer:—F. C. Caldwell, H. W. Caldwell & Son, Co., Chicago.

Councilors:—George D. Babcock, H. H. Franklin Mfg. Co., Syracuse, N. Y.; Jerome R. George, Morgan Construction Co., Worcester, Mass.; W. A. Layman, Wagner Electric Mfg. Co., St. Louis; M. B. McLauthlin, George T. McLauthlin Co., Boston; George O. Rockwood, the Rockwood Mfg. Co., Indianapolis; J. H. Schwacke, Wm. Sellers & Co., Philadelphia; H. H. Rice, General Motors Co., Detroit.

John D. Hibbard was reappointed commissioner, and Homer D. Sayre, secretary.

Prepare for After the War

F. C. Schwedtman, of the National City Bank of New York, delivered an inspiring address on "The Banker's Co-operation with Industry". A challenge for constructive work now rests upon the leaders in all classes to bring their members unrestrictedly into the patriotic army for national service and antagonism, suspicion and distrust have no place in the efficient attainment of maximum production, said Mr. Schwedtman. Previous crises both in war times and in peace, have found banking and industry not always firmly linked. Not all bankers have understood that their functions have been to assist in every possible way the logical industrial developments of their communities. As an example of the way the banker can co-operate with industry, Mr. Schwedtman alluded to the ignorant competitor who does not know how much it costs him to do business and who has a poor organization. The manufacturer who has solved these problems is vitally interested in the education of his ignorant competitor and the banker can be of great service in such educational work by insisting upon proper business standards. "In preparing for war," said Mr. Schwedtman, "let us not prepare for the economic war that is to come after this great military struggle. It is vital that we should prepare for the immediate situation, but also essential that we put ourselves in readiness for the fight that must be waged after peace comes. There never was a time when efficiency was of greater importance. If the preparation for the war into which this country has been plunged will bring the employers and workers of the United States into closer and more harmonious touch with each other, we will be well com-

pensated for the expenditure of several billions of dollars."

The committee on the prevention of industrial accidents reported that meetings on the conference board on safety and sanitation have not been held as frequently of late as in former years, due to the fact that safety work now is well organized. Most of the work during the year has been along educational lines. It has been found necessary to make earnest efforts to properly educate the employers as well as individual workmen in order to impress upon the former the necessity of proper consideration of the safety movement.

Luther D. Burlingame, of the Brown & Sharpe Mfg. Co., Providence, spoke on the recent formation of the American Institute of Weights and Measures. This organization, which includes in its membership a large number of the leading industrial concerns in this country, Mr. Burlingame said, resulted from a realization of the likelihood that the efforts of numerous government employes, college professors and others to push the adoption of the metric system in this country might result successfully if not intelligently opposed. The adoption of the metric system, Mr. Burlingame said, would necessitate the recalculation of all existing dimensions in the English-speaking world, a proceeding which would be little short of disastrous in its effect upon industry in general. As an illustration of the impractical suggestions of proponents of the metric system, he cited the recent recommendation that the government build the new guns for the navy to metric measurements. This suggestion, Mr. Burlingame said, is so unreasonable as to savor of disloyalty.

James T. McCleary, of the American Iron and Steel Institute clearly and forcibly showed the necessity for stability of law if progress is to be promoted. He urged that legislators be judged not so much by the laws that they contrive to have put on the statute books as by the laws which they prevent from being enacted.

The necessity for an American merchant marine was discussed by Wallace Downey, New York City, president of the Downey Ship Building Corporation, recently formed to operate a plant on Staten Island. "If it were not for the British navy, Great Britain would long ago have been at the mercy of the Germans," said Mr. Downey, "and were it not for the British merchant marine, the British navy would have been defeated by the Germans. Further, if it were not for the British merchant marine, a Prussian flag might be hanging over there on the wall, instead of the stars and stripes. A navy without a merchant marine is like a locomotive without a tender, incapable of moving." He described the rise and fall of the American merchant marine, pointing out the need for protection of shipping under the American flag as a remedy.

Employment of Women Probable

The apprenticeship committee cautioned the association not to lose sight during the present time of stress of the necessity for continuing the training of apprentices in the various industries. At this time it is especially necessary, the committee stated, that apprenticeship systems shall be fostered and intensified as much as possible. The committee expressed

WILLIAM LODGE

the belief that by the time of the next annual meeting it will have been found necessary to put women upon many jobs which now are being filled by men.

The committee on industrial education was devoted mainly to the so-called Smith-Hughes bill recently enacted, which provides federal aid for vocational education. This act provides for large appropriations to the various states to be spent in vocational training and members of the association were urged to cooperate to the end that competent boards may be appointed in the various states to see that this money is efficiently spent and that the intention of the Smith-Hughes law is carried out.

The annual banquet was held Thursday evening at the Hotel Astor, speakers being William A. Prendergast, comptroller of New York; Jeremiah W. Jenks, of New York University; and Reverend John Herman Randall, of Mount Morris Baptist church, New York.

Obituaries

William Lodge, president of the Lodge & Shipley Machine Tool Co., Cincinnati, died suddenly April 30, at his home in Cincinnati. Mr. Lodge was probably one of the best known men in the machine tool industry. His active association with the Lodge & Shipley Machine Tool Co. for over a period of 25 years brought him into close association with the foremost manufacturers in the United States. William Lodge was born in 1848 in Leeds, England, where he served his apprenticeship, coming to Philadelphia in 1869. In 1872 he began work in Cincinnati as a journeyman machinist; in 1880 he started in business for himself under the name of Lodge, Barker & Co., which was afterwards known as Lodge, Davis & Co. In 1892 the Lodge & Shipley Machine Tool Co. was organized with Mr. Lodge as president and Murray Shipley, vice president. Since the formation of the Lodge & Shipley Machine Tool Co., Mr. Lodge has devoted his life to the improvement of the lathe. He was second president of the National Machine Tool Builders' Association, for two years treasurer of the National Metal Trades Association, president of the Ohio Manufacturers' Association for two years, a member of the American Society of Mechanical Engineers, a member of the Machinery Club of New York.

Edward W. Weaver, cashier of the Bethlehem Steel Co., South Bethlehem, Pa., died April 15 after a brief illness. Mr. Weaver was about 37 years old.

Frederick Anton Eilers, noted mining engineer and metallurgist, died April 21 at his home in Sea Cliff, L. I., aged 79. He was born and educated in Germany and came to this country in 1859. He assumed charge of mines and copper smelters in West Virginia, later became deputy United States commissioner of mining statistics, then went to Salt Lake City as part owner of the Germania smelter and later formed the firm of Billings & Eilers. From 1883 to 1889 he was director and general manager of the United Smelting & Mining Co., of Montana. On the organization of the American Smelting & Refining Co., Mr. Eilers became director and member of the executive committee. He was an officer of other mining companies. His son, Karl Emrich Eilers, is vice president of the American Smelting & Refining Co.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

RALPH E. GRAVES, district manager of the Cleveland Punch & Shear Works, Cleveland, with headquarters at Pittsburgh, on May 1 was transferred to Chicago to take charge of a new office at that center. Mr. Graves is one of the best known men of the machinery trade in the central west. He has been connected with the Cleveland company for seven years. Previous to becoming identified with the punch and shear company, he was in the purchasing department of the Variety Iron & Steel Works, Cleveland. T. J. McNamara, who has been with the Cleveland company two years, has been appointed successor to Mr. Graves.

M. P. Crane, son of T. I. Crane, of Piling & Crane, Philadelphia, will sail April 28 to join the American ambulance corps in France.

W. J. Scholes has been appointed superintendent of the foundry branch of the General Motors Co., located at Stockton, Cal., where gas tractors are manufactured.

Edward C. Huser, for the past 33 years vice president and treasurer of the John Van Range Co., Cincinnati, is now in the executive department of the Columbus Life Insurance Co.

Edward A. Neill, formerly with the Consolidated Coke Co., Pittsburgh, now is identified with William Wieman, pig iron, coal and coke dealer, with offices in the Union Arcade building, Pittsburgh.

Eugene G. Grace, president of the Bethlehem Steel Co., was elected a director of the American Iron and Steel Institute, at a meeting held in New York, April 25. Mr. Grace succeeds the late Frank S. Witherbee.

H. M. Shepler has resigned as assistant manager of sales of the American Sheet & Tin Plate Co., Widener building, Philadelphia, to accept a position in the sales organization of the Autocar Co., Ardmore, Pa.

James W. Menhall, who recently sold his interest in the Warner Trailer Co., Beloit, Wis., and retired as vice president, has organized the Highway Trailer Co., of Eagerton, Wis., to manufacture motor trailers.

Fred H. Stevens has resigned as a director of the United States Cast Iron Pipe & Foundry Co., owing to illness. This vacancy, and that of V. H. Overholt, deceased, have not been filled.

Col. H. P. Bope, president of the Americus Republican club, Pittsburgh, acted as toastmaster at the thirty-first annual dinner given by that club at the William Penn hotel on April 27. George W. Perkins was the principal speaker.

E. C. Bauer, who has been connected with the sales department of

RALPH E. GRAVES

the American Manganese Steel Co., Chicago, for a number of years, recently has been appointed assistant to the vice president.

Henry Fagan, superintendent of the cutlery department of the Landers, Frary & Clark Mfg. Co., New Britain, Conn., completed 50 years service with the company April 21, and was presented with a gold watch by his associates.

T. F. Bailey, president of the Electric Furnace Co. of America, Alliance, O., gave an illustrated lecture on the application of electricity in the heat treatment of steel before the Cleveland Engineering Society, Tuesday evening, April 24.

Harry H. Barclay, manager of the Beryk Co., Cleveland, manufacturers of foundry vibrators, has been elected president and general manager of the company, succeeding Chas. H. Olds, resigned. M. W. Barclay has been made vice president, and E. B. Carbaugh, secretary and treasurer, succeeding C. H. Keith, resigned.

D. B. Gallagher, formerly superintendent of the bar mill of the Pittsburgh Crucible Steel Co., has been appointed superintendent of the blooming and billet mills. C. S. Capehart has succeeded Mr. Gallagher as superintendent of the bar mill.

J. D. Holcomb, who has been in charge of the reconstruction of the old Diamond State Steel plant at Wilmington, Del., now operated by the Wilmington Steel Co., a subsidiary of the Midvale Steel & Ordnance Co., has resigned. He has been succeeded by F. J. Cort, of Duquesne, Pa.

A. M. Schoyer, vice president of the Pennsylvania Lines West, with headquarters at Chicago, will read a paper entitled, "Wanted, a Box Car," April 27, before the Railway Club of Pittsburgh. The meeting will be held at the Colonial Annex hotel, Pittsburgh.

H. Cole Estep, editorial director of the Penton Publishing Co., Cleveland, addressed the Philadelphia Foundrymen's Association May 2 on "The Cleaning of Castings". The program for the allied foundrymen's convention to be held in Boston the week of Sep. 24 was discussed.

B. C. Thayer, chief electrician of the metropolitan water and sewerage board in Clinton, Mass., has resigned to go with the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., where he will have charge of the installation of electrical machinery in submarines.

Charles S. Vougt has been made assistant general manager of sales of the American Steel Export Co., Woolworth building, New York. Mr. Vougt formerly was one of the managers of the order department of the Cambria Steel Co. and is familiar with the details of export merchandizing and conditions from a mill standpoint.

B. T. Bechtel, who had been in charge of the Pittsburgh office of the Mark Mfg. Co., Evanston, Ill., for about 10 years, has been appointed assistant general manager of sales of the company, with headquarters at Evanston. Mr. Bechtel has been with the Mark company 15 years and took charge of the sales in the Pittsburgh district in 1912. His successor has not yet been named.

Government Gets Down to Real War

Every Arrangement Being Made for Supreme Effort With Human and Material Resources—Steel and Shells Placed—England Wants 100 Steel Vessels —Munition Plants Being Extended by Federal Aid

WASHINGTON, May 1.—With the government now actively placing orders and making inquiries for large tonnages of steel, machinery and machine tools; with plans under way to considerably expand the capacity of private munition plants; with conferences going on between federal officials and the British and French commissions as to supplying the European allies with war material, ships, foodstuffs, money and armies, the United States is getting a foretaste of the tremendous task that modern war has demanded of it. This government is fully determined on victory in the gigantic conflict now at hand. All of its resources, human and physical, will be drawn upon to any extent necessary to attain that end. This policy has been made known to its allies, through the commissions now in this country. It is proposed that America shall arm itself fully in every direction and as quickly as possible, but at the same time shall not interfere with furnishing supplies to the allies.

Ships are the most pressing and immediate need. Plans are being hurried for the construction of 1,000 wooden ships. Officials are considering seriously the idea of adding to this fleet by building steel merchant vessels at once. At the same time it is desired not to disrupt any more than possible plans for building naval vessels, although it may be found necessary to confine these activities to smaller craft, such as torpedo boats, submarines and submarine chasers, and to temporarily suspend work on capital ships. There is, however, considerable hesitancy as to suspending this class of work. The question of getting supplies of steel is absorbing the attention of government officials and manufacturers, and upon its determination largely depends what may be done in the way of adding to the number of steel merchant vessels and foregoing work for the present on capital craft. The British commission is said to be urging that its government be supplied with 100 steel merchant vessels and also some of wood as quickly as possible, provided this does not bring about injury to home interests.

The submarine menace apparently has been discussed during the conference here from an entirely practical point of view. Vessels to carry war supplies and foodstuffs, it is contended, are urgently needed. The matter of hastening construction of ships and providing for additional vessels both for this government and Great Britain, it has been claimed, was fully discussed at a conference held here last Friday between officials of the United States shipping board, the council of national defense and the navy department, the British and French commissions and Chairman Charles M. Schwab, of the Bethlehem Steel Corporation. Some details of this conference may be officially announced later.

Specific plans for increasing the tonnage for shipping to America's allies are to be worked out by a committee named by the council of national defense. This committee consists of Chairman Denman, of the shipping board; P. A. S. Franklin, president of the International Mercantile Marine; H. H. Raymond, president of the Coastwise Shipping Association; Eugene Tyler Chamberlain, commissioner of navigation, department of commerce; D. T. Warden, manager of the foreign shipping department of the Standard Oil Co.; L. H. Shearman, vice president of W. R. Grace & Co.; A. H. Bull, of A. H. Bull & Co., and Frank C. Munson, of the Munson Steamship Line. One of the plans under way to increase shipping tonnage is through legislation which will give the government direct control of American shipping. It is proposed that the President and the shipping board shall be authorized to direct the movements of American ships so that they could be operated where most needed. If it is found ships can be taken from the coastwise trade without a severe disarrangement of railroad schedules and service, it is possible many will be put to transporting supplies to the allies. Within 30 days the shipping board, it is believed, can put into transatlantic service 65,000 additional tons, 25,000 from the coastwise trade and the remainder German and Austrian ships under repair. The department of labor has announced that within a month it can, aided by labor union heads, have 40,000 workers ready to go to the ship yards throughout the country.

Meanwhile, the steel mills are being drawn on by the government not only for tonnages for ship construction, but also for material for all kinds of purposes having to do with war requirements. It has been estimated that immediate necessities in prospect for the government will call for more than 1,000,000 tons of steel, of which 200,000 tons would be necessary for hull construction for naval vessels. According to a statement at the navy department, the first contract for structural steel placed under the recently adopted fixed price policy involved 7,000 tons for a pontoon at the Mare Island navy yard, to the Illinois Steel Co. Requirements for 25,000 tons for ship repairs and for storage are also about to be distributed, and will be followed in quick succession by heavier tonnages. This material is being supplied to the government at the agreed base prices of 2.90c per pound for plates and 2.50c for shapes and bars. Other heavy requirements are being made for steel and alloys for shells and ordnance, as well as machinery and machine tools. In this connection it is learned that the war department is planning to add to the capacity of private munition plants to fill pressing needs for heavy ordnance.

An idea as to how the United States can help win the war against Germany is said to have been outlined before officials of this government by the French commission. These suggestions embodied the supplying of food, coal and steel with which to make munitions; the turning of every effort toward increasing transportation facilities, principally by building ships, locomotives, railroad cars and automobiles; and liberal loans.

The cost of building cars, ships and all transport facilities abroad, it was pointed out, has increased. These carriers are being worn out faster than they are being replaced. They are wearing out faster than normally because of the lack of lubricating oils. This shortage in oil is only one of the factors which indirectly bear upon the shortage of food and the lack of facilities for its distribution. Meanwhile, this lessened number of cars and ships is being requisitioned

heavily for carrying expeditionary forces.

Iron Ore and Coal Get Right of Way

Washington, May 1.—The council of national defence has directed railroad officials to give shipments of coal and iron ore preference over all other traffic until the close of the lake navigation season. This action was taken after a joint meeting of shippers and representatives of the American Railroad Association last week. Steel makers said they will not be able to meet demands of the government unless sufficient supplies of raw materials are available.

C. D. Dyer, vice president of the Shenango Furnace Co., Pittsburgh, who was chairman of a meeting of shippers and railroad traffic men at Pittsburgh April 17, appointed a committee to assist in expediting the movement of coke, limestone and ore. This committee consists of E. H. Gary, chairman of the United States Steel Corporation; C. M. Schwab, Bethlehem Steel Co.; A. C. Dinkey, the Midvale Steel Co. and allied interests; W. L. King, the Jones & Laughlin Steel Co., who also represents a group of iron and steel industries operating in western Pennsylvania, Ohio and West Virginia; Mathew Andrews, M. A. Hanna & Co., representing lake ore shippers outside the United States Steel Corporation. William Whigham, vice President; L. C. Bihler, traffic manager, and E. M. Marquis, assistant traffic manager of the Carnegie Steel Co., attended the meeting of the joint committee.

Shell Contracts

Washington, May 1.—Numerous contracts for munitions have been awarded by the bureau of ordnance of the navy and war departments. Of common projectiles for the navy department, the E. W. Bliss Co. has received 10,800 6-inch at $20 each; Lindermann Steel & Machine Co., 76,200 5-inch, at $10.33 each; Harrisburgh Pipe & Pipe Bending Co., 97,000 4-inch, at $7.45 each; Platt Iron Works, 90,000 six-pounders, at $1.68 each; and the Poole Engineering & Machine Co., 1,170,000 one-pounders, at 46 cents each.

Of target projectiles for the navy department, the Tredegar Co. has received 3,500 14-inch, at $88.52 each; 2,500 12-inch, at $55.13 each; and 2,000 8-inch at $24.15 each; British & American Mfg. Co., 10,000 5-inch, at $10.20 each; Bethlehem Steel Co., 7,000 4-inch, at $8.20 each; American Car & Foundry Co., 10,000 3-inch at $3.35 each; and the Poole Engineering & Machine Co., 100,000 one-pounders, at 37 cents each.

Cast iron shells for the war department include 5,400 6-inch at $12.75 each, to the W. J. Oliver Co.; 900 8-inch, at $25.15 each; 2,800 10-inch, at $36.71 each; 3,300 12-inch at $49.32 each; 300 14-inch at $76.99 each; 2,400 12-inch at $38.19 each; 2,100 12-inch at $41.46 each, and 200 16-inch, at $108.13 each, to the Tredegar Co.

Announce Findings in Iron and Steel Rate Cases

Washington, May 1. — The interstate commerce commission has entered an order denying an application made on behalf of the Chicago, Milwaukee & St. Paul railroad and other carriers for authority to establish rates on rails and railroad track fastenings, carloads, from St. Paul and Duluth, Minn., and related points, to Amasa, Champion, Crystal Falls, Escanaba, Iron Mountain, Iron River, Menominee, Republic and Stambaugh, Mich., and Grand Rapids and Oshkosh, Wis., without observing the long-and-short-haul provision of the act to regulate commerce. The commission has also further suspended from May 15 until Nov. 15, the operation of tariff schedules providing for increased carload rates on unfinished iron or steel agricultural implements from Cincinnati, Pittsburgh, Buffalo and other points of origin to Chattanooga, Tenn., Atlanta, Ga., and certain other destinations in the southeast.

Authority has been granted by the commission to petitioning railroads to eliminate the term "less-than-carload" in connection with a number of iron and steel articles shipped from producing points in Alabama, Tennessee and other southern states to various interstate destinations, without observing the long-and-short-haul provision. The articles include band iron, unpacked; bar iron, unpacked; bar steel or steel bars, polished or not polished, packed or not packed; boiler iron or steel, unpacked; hoop iron, muck bar, cast iron pipe, wrought iron pipe, plate iron, unpacked; plate, steel, unpacked; puddle bar and rod iron.

How Government is Buying and Distributing Steel

The system under which the government will be furnished with large tonnages of steel for war purposes at reduced prices now has been arranged and the machinery is in motion. The tonnages are to be distributed among individual manufacturers according to mill capacity. All requirements will go through a clearing house committee of steel manufacturers, chosen from the American Iron and Steel Institute, which has taken up quarters in the offices of the United States Steel Corporation, in the Wilkins building, Washington, in charge of James B. Bonner, former manager of sales at Philadelphia for the Carnegie Steel Co. The government makes out its requirements and submits them to the clearing house committee, which, in turn, recommends the manner in which the tonnage is to be distributed to the mills. The steelmakers are to make contracts only for the 1917 structural requirements of the army and navy department. Material is not to be supplied at the agreed prices where it may be carried in stock beyond the period of the present year.

Pushing Rate Case

Washington, May 1.—With the readjustment by the interstate commerce commission of its calendar setting apart the week beginning with May 7 for hearings on the railroads' proposals to make a general advance of 15 per cent in freight rates, it is believed the commission intends to dispose of this case as quickly as possible. The carriers will be expected to put in their case during the week named. Hearings will be resumed on May 23.

Tariffs providing a proposed increase of 15 cents a ton on iron ore carrying rates from lower lake ports to interior points have been suspended indefinitely by the interstate commerce commission. The commission likely will make some ruling with reference to the general iron ore rate case at an early date.

No Plans Yet Prepared for Armor Plate Plant

Washington, May 1.—Plans for the proposed government owned armor plant have not been drafted by the navy department. It is further stated that, because of present international problems no immediate attention is being given to the armor plant by the department. The plans for its erection, it has been indicated, may be "suspended" until conditions become more "propitious". The exact location for the armor and projectile plants, was formally decided upon last week when Secretary of the Navy Daniels accepted from the city government of Charleston, W. Va., the cession of 205.65 acres in South Charleston, following an inspection of available locations in that vicinity.

It is proposed that equipment of the plant shall, in the main, consist of that outlined in detail in the report made to congress on Feb. 15, 1915, by the committee headed by Senator Tillman. It is recognized, however, that the cost will be greatly in excess of the estimates made. The estimates, it is claimed, were too low, and since then the cost of material and labor has increased considerably.

Further Advances

Probably Will Be Asked by Amalgamated Mill Workers

Wage scales for the year beginning July 1, next, in sheet, tin plate and bar iron mills operating under an agreement with the union are being considered by the Amalgamated Association of Iron, Steel and Tin Workers, at a convention now in session at St. Louis. Sheet and tin plate wage scales likely will be taken up first. After the bar iron scale has been discussed, arrangements will be made for a joint meeting of officers of the Amalgamated Association and manufacturers. Although men identified with the association have received several advances in wages this year through graduated wage scales controlled by actual sales averages, it is probable that substantial increases will be asked.

Employes Receive Bonus

The employes of the two plants of the Crane Co., in Bridgeport, Conn., have been notified of a monthly bonus of 10 per cent for all employes receiving $2,100 per year or less. This bonus is for the year 1917, effective at once and payable monthly. In announcing the bonus President R. T. Crane Jr. says: "The extraordinary advance in the cost of living due to the abnormal conditions caused by the great world war, have made it difficult or almost impossible for wage earners to exist on the present wages and therefore the bonus is their due."

Makes Advance

Connellsville, Pa., May 1.—The H. C. Frick Coke Co. has announced an increase of 10 per cent in the wages of its employes. About 35,000 men were affected. The increase became effective May 1.

Labor Notes

The Myerstown Foundry & Mfg. Co., Myerstown, Pa., voluntarily has increased the wages of its employes on an average of 10 per cent, effective May 1.

The Ingersoll Milling Machine Co., Rockford, Ill., has increased wages and salaries 10 per cent, making a total increase of 15 per cent since the first of this year.

The Wilcox, Crittenden & Co., Inc., Middletown, Conn., ship chandlery, will pay a bonus of 10 per cent to all employes on June 15 for the period from April 6. If business warrants it the payments of bonuses will be continued throughout the year. About 300 men will share in the gift.

George W. Prentiss & Co., Holyoke, Mass., wire makers, have given their 500 employes an additional bonus of 5 per cent upon their monthly wages, dating from March 25. A bonus of 5 per cent, payable monthly on the wages for the preceding month, was granted by the firm on Dec. 16, 1916. Wages at the plant have increased generally over 30 per cent during the past year.

An increase of 7½ per cent has been announced for the employes of the Continental Bolt & Iron Works, Chicago. This is the sixth increase by this company during a period of a year. The total increase since March, 1915, amounted to 50 per cent.

Employes of the Wilmington Steel Co., Wilmington, Del., will share in the wage increase that becomes effective May 1 at various plants of the Midvale Steel & Ordnance Co. The increase will be approximately 10 per cent for the laborers and a proportionate amount for other workmen. About 1,200 employes are affected.

The American Forge & Machine Co., Canton, O., has announced a general wage increase of 10 per cent in all departments, effective May 1. This makes an increase of 30 per cent during the past year in addition to the bonus plan which has been put into effect giving additional pay to employes at the end of three months, six months, up to 10 years.

Iron Foundry Built

The Lunkenheimer Co., Cincinnati, has completely a new iron foundry, which occupies an area of 36,000 square feet. In addition, a pattern storage with 18,000 square feet of floor space has been constructed. Both the pattern storage and foundry buildings are reinforced concrete. Provisions have been made for future extensions. A cupola with a capacity of 10 tons per hour has been installed, together with special melting furnaces for the treatment of the various alloys used in the manufacture of Lunkenheimer products. Among the engineering appliances manufactured by the Lunkenheimer Co. are valves of all kinds, water columns and gages, whistles, pipe fittings, injectors, lubricating devices, oil pumps, etc.

The Spencer Wire Co., Worcester, Mass., has increased the wages of its 1,000 employes approximately 10 per cent, effective April 30. The readjustment will increase the wages of some of the employes more than this amount.

Brass Manufacturers Offer Aid to Government

Chicago, May 1.—Forty plants located in Chicago, members of the Chicago Brass Manufacturers' Association, have offered their services unreservedly to the United States government during the war. The offer was made in the following telegram sent by William M. Webster, head of the association, to President Wilson: "By direction of the members of the Chicago Brass Manufacturers' Association I am instructed to tender to you their plants for such service or assistance as you may call upon them for or they may be able to render our government in supporting you in the present war crisis."

Will Make Low Phos

Chicago, April 30.—Reorganization of the Magnetic Coal & Iron Co., 1324 Twentieth Century building, Chicago, has been completed under the name of the Crab Orchard Iron & Steel Co. This interest owns low phosphorus ore lands in Carter county, Tenn., and recently a blast furnace at Bristol, Va., has been bought for the production of low phosphorus pig iron. It is expected that the stack will be in operation by Aug. 1.

To Build Rolling Mill

St. Louis, May 1.—The Railway Tie Corporation has acquired the property and plant of the St. Louis Bed Co., East St. Louis, including eight acres and considerable metal and wood working machinery. Officials of the Tie company, which recently was organized with $1,500,000, announce that expenditures of $300,000 will be made for improvements consisting of a steel building, 150 x 300 feet, a foundry and a rolling mill. Work will be started at once. The officers of the company are: President, J. H. Strube, Chicago; vice president, A. A. Taylor, Harrisburg, Pa.; secretary, G. W. Burke, Chicago; treasurer, J. F. Sweeney, Chicago; manager of the St. Louis office, J. A. Huyle.

Organize Trailer Plant

James W. Menhall, Beloit, Wis., who recently retired as vice president of the Warner Trailer Co. and sold his interest to A. P. Warner, Beloit, has organized the Highway Trailer Co., capital stock $180,000, to manufacture trailers for motor vehicles. Mr. Menhall has leased the plant of the Edgerton Wagon Works, Edgerton, Wis. It is planned to begin production on May 1. Only a small amount of new equipment will be required.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

War Economy Won't Cut Steel Demand

WALL Street seems to have come to a conclusion that good old-fashioned common horse sense is to be used by those guiding our country's economic destinies through the war, and consequently feels much better. Only a week ago business circles were gloomily predicting "Commerce and industry are to be taxed to extinction. We aren't going to be allowed even a fair profit any more, either on shipments at home or abroad." Then, like a sudden atmospheric change, opinion shifted to a position that no radical steps would be taken, such as might discourage enterprise and initiative and that, in fact, normal trade would be disturbed as little as possible. The action of the national defense council in acquainting itself with the views of representative business interests has been greeted warmly as an indication of the national policy.

As for definite news of the government's intentions financially, business men are as much at sea as ever. There are a good many conjectures coming out of Washington, but thus far we have no really concerted financial program. The recent action of congress in voting a war fund of $7,000,000,000 was merely a more or less circumscribed letter of credit. How the money is to be raised is another matter, but it must come from somewhere. Money invested in "liberty" bonds cannot be spent in automobiles or millinery. Some economizing must be done, despite the advice of certain well-meaning people against "hysterical saving." The money so raised will be expended in this country for munitions for our own and allied armies and for ships to transport these supplies. Such a process means a shifting from certain commercial and industrial lines; luxuries which will suffer first from retrenchment. It is certain, however, that a general policy of economy would have to sweep wide before it would effect a perceptible decrease in demand for the various peace products of the steel trade, while the demand for its war products is greater than ever. It does not now seem likely that this war can last long enough or attain scope broad enough to diminish the nominal demands of our 100,000,000 people for steel in its various manufactured forms. Such a contingency has not even entered the minds of those stock market observers who analyze the prospects for the steel securities. Their thoughts have centered rather on the possibility of heavy taxation and of the effects of low priced orders from our own government upon profits. Belief is spreading that corporations will be accorded fair treatment in the matter of taxation; as to low-priced government orders, it is beginning to be realized that the government requirements will not call for more than about 4 per cent of the country's annual production and therefore will not affect earnings greatly.

In the meantime, steel company profits are increasing constantly, as was indicated by last week's report of the Steel Corporation for the first quarter of 1917. This report showed net earnings of $113,000,000, as compared with $106,000,000 in the last quarter of 1916, the previous high record, and presages a still better showing for the June quarter. The steel market continues to advance, and mills are steadily completing old orders and turning to higher priced work.

Reflecting this good report, United States Steel common advanced 4⅛ points last week, and the other steel stocks were strong. But in general the stock market has been quiet; the outside public has been cautious, while professionals are doing nothing to stimulate bullish activities.

Bankers seem certain that a period of higher money rates is ahead. A reflection of this probability is found in the gradually contracting excess reserve account in the weekly bank returns and in the recent firmer tendency of time loans and discounts. The money market situation is worth watching, especially for those persons who are counting on a long term of even relatively easy rates for accommodation, in view of tremendous loan negotiations now pending in connection with war finance.

Colorado Fuel Doubles

Net earnings of the Colorado Fuel & Iron Co., Denver, Colo., for the first quarter of 1917 were more than double those for the same period in 1916. The quarterly statement of the Colorado company shows that net earnings for the first three months of 1917 amounted to $2,361,122, compared with $1,131,349, for the first quarter of 1916. The comparative statement of earnings for the years 1917 and 1916 are as follows:

	1917.	1916.
Gross receipts	$10,832,211	$6,857,443
Operating expenses	8,471,088	5,726,094
Net earnings	$2,361,123	$1,131,349
Other income	149,133	176,400
Total income	$2,510,256	$1,307,749
Bond int., taxes, sinking funds, etc.	748,139	705,421
Surplus for quarter.	$1,762,117	$602,328

Merger Approved

The merger plan of the stockholders' committee of the American Rolling Mill Co. to take over the Columbus Iron & Steel Co., Columbus, O., with its two blast furnaces, has been approved by the directors of the company. The scheme which will be consummated immediately calls for the refinancing of the company and provides for an exchange of stock in the ratio of five shares of new common stock for one of the present common. The committee which has charge of the reorganization consists of Judge Rufus Smith, C. A. Hinsch, J. M. Hutton, Frank Simpson, George M. Verity and Paul Sturtevant.

Financial Crop Ends

The Crucible Steel Co. has declared a dividend of 3 per cent against back dividends on the preferred stock, payable May 19 to holders of record May 5. This makes a total of 10¾ per cent paid on back dividends this year and reduces the deferred charge to 6 per cent.

* * *

An excise tax of 4 cents on every $100 of authorized capitalization of Illinois corporations and the same amount on the capital of foreign corporations employed in the state is proposed by bills now before the Illinois legislature. The administration is behind the movement. The tax is estimated to yield $5,000,000 annually. It is purposed to give the first million to the state university, the second to the state school fund and the remainder to the general fund of the state.

U.S. Buying War-Making Equipment

Government Requirements Coming Out and Builders Eager to Co-operate—Ship Yards Active—Pacific Coast Industries New Factors in Chicago Territory—Railroads Buy in West

MACHINERY builders have begun to book many orders for the United States government and for private plants engaged in munition work for the government. The outstanding feature of the market last week was the placing of orders by the Bethlehem Steel Co. for lathes, planers and gun-making machinery, involving a cost of between $500,000 and $1,000,000. Many smaller plants also have been in the market for munition equipment for work on government contracts. Government instructions as to rush delivery are numerous. The arsenals at Watertown, N. Y., Watervliet, N. Y., and Charleston, W. Va., the navy yards at Brooklyn, Puget Sound and Philadelphia, and various plants of the United States signal corps have taken bids on tools. Private business has fallen far into the background with deliveries constantly dropping further behind.

Railroad buying of equipment is practically at a standstill, due to the high prices. Among the scattered inquiries which have been in the market lately is one for six locomotive cranes, 20 to 25 tons, for the New York, New Haven & Hartford railroad. Another road also is in the market for a similar list. However, many inquiries for two, three and four tools have been issued by locomotive and car builders.

New ship yard enterprises reported in recent months have not yet begun to buy equipment. The Newport Ship Building & Dry Dock Co., Newport News, Va., has not yet closed for the 10 cranes for its new ship ways, for which it recently inquired. The Baltimore Dry Dock & Ship Building Co. will erect a $3,000,000 addition to its yard at Baltimore. The capital for this work will be furnished by the present stockholders of the company. Engineers in charge of this work are Day & Zimmerman, Philadelphia. A $50,000,000 corporation for the building of ships is being formed by Baltimore and New York interests, and has obtained a large tract at Baltimore, opposite the plant of the Maryland Steel Co., ship building subsidiary of the Bethlehem Steel Co. It is reported that Bernard N. Baker, formerly chairman of the United States shipping board, is heavily interested and may become president. Lord & Burnham, Irvington, N. Y., have closed for punches, shears and other boiler shop equipment. The Edison Lamp Co., Harrison, N. J., is in the market for a small list of tools.

Improvements to cost nearly $1,000,000 are to be made at the Charlestown, Mass., navy yard at once. One addition will consist of a six or seven-story storehouse for general purposes to cost $500,000. Improvements in the central power plant will cost $150,000, mostly for the installation of additional machinery. An extension to cost $60,000 is to be built on the chain shop, the only shop making chains in any American navy yard. Another addition will be a round house to cost $20,000 to be used for housing the navy yard locomotives and cranes. Two locomotive cranes are expected to be added to the equipment. Under a previous naval appropriation $37,500 is being spent on an addition to the power building to accommodate additional air compressors for operating pneumatic tools and machinery.

Chicago Market Active

MACHINE tool buying is for small lots and single tools, though some larger inquiries have been received. Price advances continue to be made in the effort to keep ahead of increasing cost of material and labor. The city of Chicago is asking figures on a universal saw table and two 16 x 24-inch pattern lathes. The Santa Fe railroad, which has been sending out its inquiries singly for some time is now in the market. Included in current inquiries from this road are the following: One 800-pound steam hammer, two 24-inch x 12-foot lathes, one 36-inch x 12-foot lathe, one 18-inch punch and shear, one 24-inch upright drill, one heavy-duty upright drill, one 4-inch centering machine and shaper.

The purchase of the plant of the Temple Mfg. Co., Cicero, Ill., by the Hurley Machine Co., released about 40 heavy tools. These machines were taken by the Marshall & Huschart Machinery Co.

The machinery industry on the Pacific coast is developing rapidly. A number of projects are under way in addition to the great expansion of the ship building industry which is assuming heavy proportions. The Miller Carburetor Co. will build a plant at Los Angeles for the manufacture of aluminum cases for aeroplane motors.

The St. Louis Machine Tool Co. will build a plant at St. Louis. The Keystone Drilling Co. will establish a plant at Joplin, Mo., to build mining machinery. The Northern Pacific railroad will increase its shop at Brainerd, Minn. The Henry Vogt Machine Co. will build a drop forge shop at Louisville. The U. S. Silica Co. will build a power plant at Ottawa, Ill. The Capitol Art Metal Co. will equip a plant for the manufacture of metal furniture.

Buying Picks Up in Pittsburgh

DOMESTIC demand for machine tools at Pittsburgh is heavier than it has been in many months. Several dealers say bookings in May exceeded those of the previous 60-day period. Several railroads, including the Wabash-Pittsburgh Terminal, the Pennsylvania and the Monongahela, continue to buy equipment for shops in this and adjacent territory. The Carnegie Steel Co. is asking bids on a number of punches and shears for installation in plants in western Pennsylvania and Ohio. The situation for munition making equipment remains unchanged. The United States government has not yet distributed orders directly or indirectly for shell-making machinery.

Business Brisk With Cleveland Dealers

PRICE advances on some lines of shop equipment have been announced by Cleveland machine tool dealers. Drill presses have advanced approximately 10 per cent, effective May 1. Some middle western

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Chicago Office: Room 1370 Peoples Gas Bldg., 122 South Michigan Blvd., A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Bldg., Frank Wallace, District Representative
J. E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents

builders of milling machines have increased prices 10 per cent, effective May 1. Punches and shears have advanced about 5 per cent. Builders state that the increasing cost of raw material and labor has forced the revision. Universal milling machines and vertical boring mills are finding a ready market. A number of good inquiries have been received by local dealers for heavy tools of this type. The Permanent Products Co., 1020 Engineers building, Cleveland, expects to erect an extensive plant and is inquiring for equipment. This company will purchase bolt threaders, dies, nut tappers and punch presses. Machine shop equipment will be purchased in limited quantities and some tool-room machines will also be bought. The Toledo Machine & Tool Co., Toledo, O., M. J. Hinde, president, plans to erect a new plant in Toledo, at a cost of approximately $500,000. The plant will be built in three units, the first being ready for occupancy sometime this year. The Standard Steering Wheel Co., Rockefeller building, Cleveland, plans to build a plant at Sidney, O., and has sent out inquiries for complete woodworking equipment.

Cincinnati Market Slow

BUYING has fallen off in the Cincinnati machine tool market, but this is thought to be only temporary, as builders expect heavy inquiries soon from plants having government contracts for munitions of war. Several builders of lathes have caught up on orders and some deliveries can now be made in two or three weeks. Milling machines are scarce. The Advance Tool Co., Cincinnati, which is operating a plant at Canal and Jackson streets, has incorporated for $50,000, and will extend its manufacturing facilities. The Warner Gear Co., Muncie, Ind., is purchasing equipment for a new addition to cost $120,000. The Dayton Mechanical Tie Co., Dayton, O., has been incorporated for $50,000. Stegner & Hughes, architects, Cincinnati, will purchase power plant equipment soon for a new power plant for the Lippincott Co., to be erected at Osgood, O.

Along the Middle Atlantic Seaboard

BINGHAMTON, N. Y.—Barnes, Smith & Co. will build a 3-story plant, 60 x 128 feet.

BROOKLYN.—Cronk Works of the National Lead Co., 135 Marshall street, will build 4-story plant, 50 x 228 feet, to cost $90,000.

BROOKLYN.—Hauck Mfg. Co., maker of oil burners, is taking bids on a general contract for a 2-story plant to be 80 x 95 feet, at Eleventh street and Second avenue.

BROOKLYN.—Montrose Improvement Co. has broken ground for a shop and foundry building of brick and steel construction, 1 and 2 stories, 80 x 180 feet.

BROOKLYN.—Sperry Gyroscope Co., 40 Flatbush avenue, is making plans for a plant addition to be 11 stories, 75 x 100 feet, of reinforced concrete.

BROOKLYN.—General contract for a 7-story plant and warehouse to cost $165,000 for Boerum & Pease Co., has been let to the Turner Construction Co., 244 Madison avenue.

BUFFALO.—Klinck Bros. will build an addition to their boiler house.

BUFFALO.—J. H. Williams & Co. will erect three buildings for manufacturing, to be one and two stories, 20 x 83 feet, 63 x 80 feet, and 20 x 98 feet, respectively.

CANASTOTA, N. Y.—The city plans to build a 3-story public building, 87 x 105 feet, to cost about $50,000. W. T. Towner, 110 Morningside Drive, New York, is preparing the plans.

COLLEGE POINT, L. I., N. Y.—L. M. F. Engineering Co. plans interior alterations to its plant at a cost of $6,000.

COLLEGE POINT, L. I., N. Y.—Queensboro Drug Co. will build a plant, 6-story, 50 x 100 feet, to cost $50,000.

DUNKIRK, N. Y. — Continental Heater Corporation will erect a foundry addition, 48 x 112 feet.

JAMAICA BAY, L. I., N. Y.—Wm. Harvey Corporation, smelters, has purchased property and plans to erect smelter. No architects nor engineers yet have been selected.

JAMESTOWN, N. Y.—Jamestown Wood Finishing Co. will build a 2-story plant, 32 x 80 feet.

JOHNSON CITY, N. Y.—Village of Johnson City may install a filtration plant. John M. Duryes has charge.

MEDINA, N. Y.—The Erie Pump & Engine Works has been incorporated with $50,000 capital to manufacture pumps and engines and to do foundry work by C. S. and R. F. Sweet and F. Marion Roler.

NEW ROCHELLE, N. Y.—H. W. Johns-Manville Co., Madison avenue and Forty-first street, New York City, has broken ground for a plant addition, 4-story, 75 x 170-foot, to cost $75,000. Jones Speedometer Co., Cedar street, New Rochelle, is the lessee.

NEW YORK.—The Shaw Instrument & Mfg. Co. has increased its capital from $25,000 to $100,000.

NEW YORK.—The North Atlantic Metal Corporation has increased its capital from $10,000 to $50,000.

NEW YORK.—Hudford Motor Car Co. will move its plant from Long Island City to 2441 Third avenue, where it will occupy four floors of 60,000 square feet in area.

NEW YORK.—Locke & Co., manufacturer of automobile bodies, 218 West Eighty-fourth street, will build plant, four stories, 72 x 180 feet, reinforced concrete and brick, to cost $100,000.

NEW YORK. — The Raymond-Bliss Tool Co., Manhattan, has been incorporated with a capital of $8,000 to manufacture jigs, gages, small machine tools, etc., by H. G. Bliss, P. W. Raymond, N. W. Peters, 74 Broadway.

NEW YORK.—The Federal Tool & Alloyed Steel Corporation has been organized to manufacture iron, steel and manganese products by C. H. Burke, T. Towne and W. T. Fort, Platt street.

NEW YORK.—The B. & S. Machine & Tool Co. has been organized to manufacture machinery tools, dies, etc., by F. Surtskin, A. Sperman and N. Kavenoff, 152 East 103rd street.

NEW YORK.—The Army & Navy Equipment Co., Manhattan, has been incorporated with a capital of $25,000 to manufacture military equipment, by E. W. Harding, J. Brenner, A. Marax, 754 East 169th street, Bronx.

NEW YORK.—The Toronto Chemical Mfg. Co., Manhattan, has recently been incorporated with a capital of $20,000, for the manufacture of chemicals, by E. A. Eichner, J. M. Cuff, M. Noulius, 220 West Forty-second street.

ONEONTA, N. Y.—James F. Elliot will build a blacksmith shop and garage, to cost $5,000.

ROCHESTER, N. Y.—Gleason Works, 100 University avenue, will build a plant, one and two stories, 100 x 360 feet.

ROCHESTER, N. Y.—Taylor Shantz will build a 2-story plant, 79 x 128 feet. Architects are Crandall & Stroebel, 401 E & B building.

SYRACUSE, N. Y.—Engel Machine Tool Co. will build a plant, 100 x 440 feet, one and two stories. The Ferro Concrete Construction Co., Cincinnati, is the builder.

SYRACUSE, N. Y.—The Hotaling, Warner Co., 720 North Clinton street, plans to erect a 3-story addition, 39 x 40 feet, to its boiler house. Russell & King, Snow building, are preparing the plans.

TROY, N. Y.—Cluett Peabody Co. will erect a 9-story plant, to cost $1,500,000. Engineers are Westinghouse, Church, Kerr & Co., 37 Wall street, New York City.

TUCKAHOE, N. Y.—Mitchell & Grennelle have been incorporated to manufacture iron

Government Needs

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., frequently asks for bids on machine tools for installation in various navy yards. These inquiries will be published in The Iron Trade Review. Machine tool builders and dealers wishing to submit proposals to the government are requested by the Navy Department to ask for the schedule numbers which will be always given with the specifications of the machines. The date of opening bids and place of delivery, will follow the schedule numbers. Requests for schedules should be addressed to Bureau of Supplies and Accounts, Navy Department, Washington, D. C. A list is published this week on page 1002.

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and steel products and insulation materials with $100,000 capital, by J. H. Grennelle and A. M. Mitchell.

UNION, N. Y.—Forging Co. will erect a forge building and blasting room, 1-story, 100 x 105 feet, to cost $20,000.

ALLENTOWN, PA.—The Victor Leather Co. has let a contract for the erection of an 80 x 300-foot manufacturing building and of a new power house.

BRIDESBURG, PA.—Plans are reported in progress for a new machine shop for the Hall Gas Engine Co.

BRIDGEVILLE, PA. — The Midway Coal Co. has been incorporated with a capital stock of $50,000; by Fred B. Ollett, J. Frank Murray and S. P. McCaffrey, all of Bridgeville.

CONNELLSVILLE, PA. — The Georges Coal Co. has been incorporated with a capital stock of $30,000; by W. E. Rice, Thomas Love and Logan Rush, Connellsville.

ERIE, PA.—The Erie Forge Co., Fifteenth and Cascade streets, has awarded the Lackawanna Bridge Co., Buffalo, a contract to erect a steel plant addition, to cost $1,000,000.

GREENSBURG, PA. — The J. F. Irwin Fuel Co. has been incorporated with a capital stock of $25,000; by J. A. Sheetz, W. D. Walthour, Greensburg; J. F. Irwin, Latrobe.

PHILADELPHIA. — Max Percival, 1156 South Fifteenth street, will erect a 1-story, shop building.

PHILADELPHIA. — Work will start at once on a boiler house for the Schuylkill Forge Co., American and Pike streets.

PHILADELPHIA. — The Union Machine Works & Iron Foundry has been incorporated with $25,000 capital by John McDonald, et al.

PHILADELPHIA.—Rush Bros. have been granted a permit to erect a plant addition for the S. S. White Dental Supply Co., at 1600 Fillmore street.

PHILADELPHIA.—Bids are being taken on the construction of a 2-story, 40 x 50-foot manufacturing building for A. M. Collins & Co.

PHILADELPHIA. — Wm. Steel & Sons Co. has been granted a permit to erect a 40 x 75-foot, 1-story addition to the plant of the Electric Storage Battery Co.

PHILADELPHIA. — The Pomeroy Construction Co. has been granted a permit to erect a 1-story, 60 x 100-foot woodworking shop at 1609 Ranstead street for H. P. Erdman.

PITTSBURGH. — The Pittsburgh Iron Folding Bed Co. has been organized with $60,000 capital by Adolph Abramovitz.

PITTSBURGH. — The Pittsburgh Printing Co. plans to erect a 4-story printing house, 70 x 106 feet. S. F. Hackert, Bessemer building, is preparing the plans.

PITTSBURGH. — H. B. Yardum, Jenkins Arcade building, plans to erect a 6-story garage, 60 x 60 feet to cost about $75,000. T. Scott, Benedum Trees building, is preparing the plans.

PITTSBURGH. — The Hammond Packing Co., 301 Ferry street, has awarded the Blome, Sinek Co., 139 North Clark street, Chicago, a contract to erect a packing plant and a storage warehouse, to cost $265,000.

PITTSBURGH.—The Wayne Oil Co. has been incorporated with a capital stock of $100,000; by William E. Frick, Sewickley; H. B. Walker, Lancaster; William M. Patterson, Pittsburgh.

RUTHERFORD, PA. — Philadelphia & Reading railroad will build power and engine house, to cost $50,000. General contract has been let to A. L. Carhart, Hale building, Philadelphia.

SCRANTON, PA. — Sprague & Henwood will build a machine shop, 1-story, 65 x 185 feet, to cost $50,000.

SCRANTON, PA.—Mine Car Supply Co. will build an addition, 2-story, 48 x 80 feet, to cost $10,000.

SHARON, PA. — Sharon Hardware Mfg. Co.'s plant recently was damaged by fire with a loss of about $50,000.

Government Inquiries

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., is in the market for the following equipment:

Two 40-inch boring and turning lathes, 1017, May 15, Washington, D. C.;
One 52-inch boring and turning lathe, 1038, no date, Washington, D. C.;
One 12-inch x 5-foot engine lathe, 1036, May 15, Pearl Harbor, H. I.;
One beveling and angle machine, 1020, May 15, Philadelphia;
One bolt-threading machine, 1035, May 15, Puget Sound, Wash.;
One hydraulic frame-bending machine, 1040, no date, Philadelphia;
One joggling machine, 1040, no date, Norfolk, Va.;
One 350-ton hydraulic joggling press, 1040, no date, Philadelphia;
Two bench millers, 1017, May 15, Washington, D. C.;
Two planers, 1040, no date, Philadelphia, Norfolk;
Three 36-inch planers, 1040, no date, Philadelphia, Norfolk;
Two punches, 1040, no date, Philadelphia, Norfolk;
Two punches and shears, 1040, no date, Philadelphia, Norfolk;
Two convertible punches and shears, 1040, no date, Philadelphia, Norfolk;
Three heavy-duty punches and shears 1040, no date, Philadelphia, Norfolk;
One rotary shear, 1040, no date, Philadelphia;
One beam bending press, 1040, no date, Philadelphia;
One horizontal drill press, 1040, no date, Philadelphia;
Two double angle shears, 1040, no date, Philadelphia, Norfolk;
Two 20 or 30-inch band saws, 1035, May 15, Puget Sound, Wash.

SWISSVALE, PA.—The board of education plans to erect a high school, to cost about $150,000.

WARREN, PA.—Jacobs Machine Mfg. Co. will erect a machine shop to be 1-story, 90 x 140 feet and cost $100,000. General contract has been let to A. L. Shawn, 7 Cedar street.

WILKES BARRE, PA.—Bids will close April 23 on pumping station and sewage disposal plant for the city. Engineers are Boyle & Hower, Bennett building.

YORK HAVEN, PA.—York Haven Paper Co. will build a machine shop and stock house, to be 1-story, 30 x 100 feet and cost $15,000.

BRIDGETON, N. J.—Board of Education will erect a school to cost $175,000.

GLOUCESTER CITY, N. J.—The Pennsylvania Ship Building Co. has purchased land adjoining its plant having a frontage of 1,100 feet along the Delaware river and a depth ranging from 200 to 1,200 feet. The company expects to erect several buildings including a large boiler shop.

JERSEY CITY, N. J.—International Elevating Co. will build a machine shop, to cost $7,000.

NEWARK, N. J.—Board of education will erect two 3-story brick and steel schools to cost $200,000 and $77,000, respectively.

NEWARK, N. J.—West Pulverizing Machine Co. has bought three acres on Evergreen avenue and will erect a plant.

NEWARK, N. J.—General Electric Co. will build plant extension, 4-story, 80 x 525-foot, reinforced concrete, at Boyd street and Seventeenth avenue. Architect now is taking bids on general contract.

NEWARK, N. J.—High Grade Belting & Weaving Co. will build plant containing engine and boiler room to be 1-story, brick, 100 x 200 feet, with extension 35 x 45 feet. A. E. Fenwick, 665 Broad street, Newark, is president.

NEWARK, N. J.—The Union Smelting & Refining Co. has commenced the erection of its plant at 146 to 164 St. Charles street, to cost about $100,000. The structure will be of brick, steel and concrete, 1-story, 110 x 450 feet. Fletcher-Thompson, Incorporated, is the engineer.

ORANGE, N. J.—The Radium Luminous Materials Corporation has purchased two acres at High and Alden streets. The company will erect a new building.

PERTH AMBOY, N. J. — The Chemical Pump & Valve Co. has been granted a permit to erect a brick addition to its plant on Gifford street.

PERTH AMBOY, N. J.—The American Smelting & Refining Co. is having plans drawn by Goldberger & Greisen for a 3-story general utility building to be erected at Maurer near here at a cost of about $80,000.

TRENTON, N. J.—Imperial Porcelain Co. will erect a factory at Neptune City. F. A. Duggan, Trenton is president.

TRENTON, N. J.—Bill has been passed by house at Washington appropriating $164,500 for enlarging magazine, new crane, etc., at Sandy Hook ordnance ground and for improvements at Dover Arsenal, which will include powder drying plant and new magazine.

NEW CASTLE, DEL.—The New Castle Leather Co. plans the erection of a 4-story, 100 x 200-foot warehouse.

WILMINGTON, DEL.—The Empire Smelting & Refining Co. has been organized to operate mills for metallurgical operations by H. E. Latter, C. L. Ramlinger and C. N. Egner.

WASHINGTON. — Bureau of yards and docks, navy department. F. R. Harris, chief, may take bids soon on an erecting shop and hangars for Florida to cost $240,000.

WASHINGTON. — Bureau of yards and dock, navy department, F. R. Harris, chief is having plans drawn for a shop for the Brooklyn navy yard, to be one and two stories, 300 x 600 feet and cost $1,000,000.

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Among New England Factories

BROCKTON, MASS.—The New England Foundry & Machine Co. has been incorporated with $10,500 capital by John G. Grant, South Easton, Mass.; Victor B. MacBain, Waltham, Mass., and L. F. Parks, Quincy, Mass.

LEICESTER, MASS.—A. Hanbrey & Co. have let the general contract for a forge room, to be 1-story, 90 x 102 feet, and cost $10,000 to E. D. Ward, Worcester, Mass.

LOWELL, MASS.—The General Machine Products Co. has been incorporated with $100,000 capital by E. B. Cooper, president; Joseph T. Walsh, Boston, treasurer, and J. W. Foster.

NEW BEDFORD, MASS. — Plans have been drawn for a machine shop and rolling mill for the Taunton-New Bedford Copper Co., to be one and two stories, 118 x 257 feet and 134 x 261 feet and to cost $125,000. Clarence A. Cook is treasurer.

NEWBURYPORT, MASS.—The Newburyport Shipbuilding Co. has been incorporated with $500,000 capital by D. J. Donahue, Boston; H. V. Tillson, Brockton, Mass., and F. H. Abbott, Wollaston, Mass.

QUINCY, MASS.—Fore River Ship Building Co. has let the general contract for submarine room, to be 1-story, 30 x 110 feet, to F. N. Grant, 247 Washington street building.

SPRINGFIELD, MASS. — Work is about to start on a 1-story plant, 50 x 175 feet, for the American Saw & Mfg. Co.

SPRINGFIELD, MASS. — The United States Mfg. Co. has been incorporated to make machine guns, etc., with $500,000 capital by Willse M. Lawrence, Portland, O., president; James Campbell, South Deerfield, Mass., treasurer, and Stuart M. Robson. It is a subsidiary of the Lawrence Machine Gun Mount Co., recently incorporated with $100,000 capital.

WEBSTER, MASS. — Webster & Southbridge Gas & Electric Co. will build an addition to its engine room, 1-story, 45 x 60 feet.

BRIDGEPORT, CONN. — Blue Ribbon Auto & Carriage Co. will build a plant, to cost $40,000. General contract has gone to Dowley & Bottomley Co., 1119 Broad street.

BRIDGEPORT, CONN. — Singer Sewing Machine Co. will erect a 5-story plant, 60 x 250 feet, to cost $150,000. The Aberthaw Construction Co., 27 School street, Boston, has just taken the general contract.

HARTFORD, CONN.—The Steel Products Co. has been incorporated with $1,500,000 capital by Harry W. Williams, Joseph W. Connor and Raymond B. Berry.

HARTFORD, CONN.—The Colt's Patent Firearms Mfg. Co. is to build a saw-tooth, 1-story, 171 x 500-foot factory which will run parallel with its south armory and be devoted entirely to United States government work.

MERIDEN, CONN.—The Foster, Merriam & Co., cabinet hardware, has applied for permission to increase its capital from $320,000 to $570,000.

MIDDLETOWN, CONN. — The Franklin Electric Co. has let contract for a brick, 4-story, 40 x 200-foot addition to its factory.

PLAINVILLE, CONN. — The hardware specialty plant of Edwin Hills was burned recently with a loss of over $30,000.

STAMFORD, CONN.—The Varuna Springs Co. has been incorporated with $25,000 capital by L. K. Schueler, Oscar J. G. Schueler and Justus J. Fennell.

WATERBURY, CONN.—Waterbury Rolling Mills will erect three plant additions, to cost $50,000. The general contract has been let to Tracey Bros. Co., 52 Benedict street.

Activities in the Central States

HORICON, WIS. — The Van Brunt Mfg. Co., manufacturer of agricultural implements, has increased its capital stock from $125,000 to $500,000.

MANITOWOC, WIS. — The Manitowoc Ship Building & Dry Dock Co. has awarded a contract to the Wisconsin Bridge & Iron Co., Milwaukee, for a number of shop additions.

MILWAUKEE. — Contracts have been awarded by the Milwaukee Gas Specialty Co., 133 Second street, for a new foundry and machine shop at Twenty-second and Clybourn streets, to be 50 x 120 feet, two stories. The general contractor is Riesen Bros. Co. O. F. Pfeil is secretary.

RACINE, WIS. — Lawrence J. Berkeley, inventor of a machine for making railroad spikes, has organized the Standard Automatic Tool Co. with a $25,000 capital, and will open a plant in the former Racine-Sattley works at Racine Junction. The new concern will manufacture a general line of automatic machines.

SHEBOYGAN, WIS.—The American Mfg. Co. will build a 4-story addition, 70 x 180 feet. W. C. Weeks is architect.

WEST ALLIS, WIS.—The city of West Allis is having plans prepared by Mead & Seastone, Madison, Wis., for a water works system.

CHELSEA, MICH. — The Chelsea Steel Ball Co., recently incorporated, with $75,000 capital stock, will build a plant. Timothy T. Callahan is general manager.

DETROIT.—The Detroit Motor Co., Vernon and Santley streets, W. R. Bamford, president, will build an addition.

DETROIT.—A factory and foundry building, five stories, 80 x 88 feet, will be erected by the Detroit Brass Works. Plans are finished.

DETROIT.—William H. Traves, 264 West High street, is planning to erect a 9-story, 58 x 158-foot light manufacturing and mercantile building, at a cost of $150,000.

DETROIT. — Giern & Anholtt, manufacturers of jigs, gages, dies, 33 South Aubin avenue, will build a concrete and steel addition 50 x 100 feet.

DETROIT.—The Parsons Mfg. Co., 2799 South Fifth avenue, manufacturer of automobile hinges, will build a 1-story plant, 60 x 140 feet, to cost $50,000.

DETROIT. — The Acme White Lead & Color Works, St. Aubin avenue and the Michigan Central railroad, is erecting a 2-story, 60 x 130-foot factory addition to cost $20,000.

DETROIT. — Geo. W. Sope, 36 Brush street, is planning to erect a 2-story, 60 x 90-foot pattern shop and foundry. Bids are being received by Engineer H. M. Lane, 58 West LaFayette boulevard.

DETROIT. — The Eclipse Interchangeable Counterboro Co., Emil Gairing, secretary, 139 Beaubien street and John R. Street, is planning to erect a 1-story, 42 x 115-foot factory and a wing 36 x 40 feet. Bids are being received by Architects O'Dell & Halpin, 1027 Hammond building.

KALAMAZOO, MICH.—The D'Arcy Spring Co. will spend about $100,000 on factory enlargements.

MENDON, MICH.—The city of Mendon plans a water works system to cost $17,000. A. D. Smith, 332 Nasby building, Toledo, is engineer.

SAGINAW, MICH.—Architects Cooper & Beckbissinger, 114 South Jefferson street, have drawn plans for a 2-story, 90 x 100-foot factory addition for Nelson Bros., Morse and Owen streets.

SAGINAW, MICH.—The Lufkin Rule Co., Fred Buck, president, Hess avenue, is planning to erect a 2-story, 60 x 100-foot factory addition to cost about $15,000. Architects Cooper & Beckbissinger, 14 South Jefferson street, are taking bids.

AURORA, ILL. — Architects Davidson & Weiss, 53 West Jackson boulevard, Chicago, will receive bids about May 1 for a 1 and 2-story, 80 x 300-foot manufacturing plant, to cost approximately $50,000.

CHICAGO.—The Strand Machinery Co. has increased its capital stock from $10,000 to $35,000.

CHICAGO. — The Carbo-Hydrogen Co., 10305 Torrence avenue, is building a 1-story plant 50 x 150 feet to cost $12,000.

CHICAGO. — Joseph Benson, 1711 East Seventy-second street is building a 1-story foundry 27 x 45 feet to cost $4,000.

CHICAGO. — The A. F. Anderson Iron Works has been incorporated with $25,000 capital by A. F. Anderson and B. N. Anderson, 7947 Laflin street.

CHICAGO.—E. E. Waful, 140 South Dearborn street, has been awarded general contract for a 1-story, 118 x 200-foot, $45,000 factory.

CHICAGO.—The Pyott Co. is making additions including a foundry and machine shop, one story, 80 x 150 feet, to cost $75,000. Davidson & Weiss, 53 West Jackson boulevard, are architects.

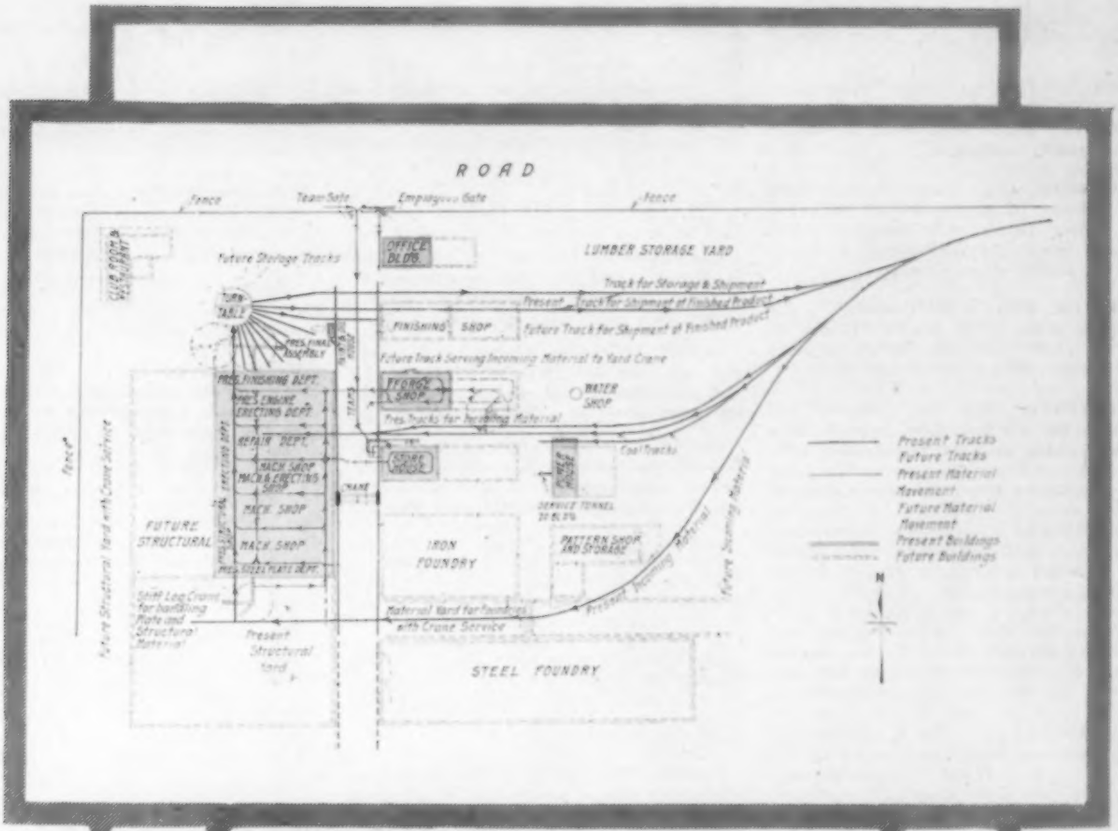
CHICAGO.—The Electric Coal Mining & Machinery Co. has been incorporated under a Delaware charter with $150,000 capital to manufacture coal mining machinery by S. N. Mighell, Ralph Battan, and Arthur A. Bettridge.

CHICAGO HEIGHTS, ILL.—The Calumet Steel Co., John H. Porter, president, 208 South LaSalle street, Chicago, plans to erect a 1-story, 75 x 150-foot tube-finishing plant, of public works, for a 250-horsepower, water-tube, high pressure boiler and fittings.

OTTAWA, ILL.—The U. S. Silica Co., Louis B. Reed, secretary, 122 South Michigan avenue, Chicago, is building a power plant to cost $75,000, including one building, 32 x 130 feet, 75 feet high and one building 32 x 150 feet, 40 feet high.

QUINCY, ILL.—A pumping station to cost $80,000 will be built here. W. P. Bushnell, 2 Wells building, is engineer in charge.

ROCK ISLAND, ILL.—The Rock Island



Build Now for Both Present and Future
But Don't Spend All the Money at Present Prices

A competent analysis of your requirements, based upon a careful study of past growth and methods and probable future development, makes possible a design for your plant sufficiently flexible to allow of tremendous extension without handicapping manufacture in any stage of expansion, thus avoiding the creation of the old-fashioned "Topsy" plant which "jes' grew up."

When the Bucyrus Company, the largest manufacturers of steam shovels and dredges in the country, decided to locate their new plant at Evansville, Indiana, it was after mature consideration had been given to the future development of market conditions. The necessity of planning the new factory for large expansion was apparent, and our first efforts as Engineers and Constructors of the complete plant were directed to this problem.

The location of the property purchased restricted transportation service to one entrance track. This necessitated circular rather than straight-line routing. After carefully laying out the above flow diagram, it was found that this seeming disadvantage could be utilized to advantage by providing a radial expansion. This allowed the desired extension with the center of activity a constant throughout development of the plant. With such provision for the future, it was economical to limit actual construction to present requirements, with suitable temporary bulkheads at points of extension. When buildings are extended, these bulkheads are moved forward and again bolted into place without any inconvenience to manufacturing operations.

Such economical results can only be obtained through skilled preliminary analysis, but the limiting of initial cost and the reduction of extension costs, to say nothing of minimizing cost of operation throughout the life of the plant, well justifies the small expense of competent analysis as the first step in your building operations.

In Arnold planned plants not only is the future given proper consideration, but every factor affecting the economics of operation and construction as well, our ideal being **maximum operating economy with minimum plant investment.**

THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL

CHICAGO: 105 South La Salle Street **NEW YORK: 111 Broadway**

Mfg. Co. will build an addition to its foundry, costing $20,000. C. E. Shields is manager.

ROCK ISLAND, ILL.—The Rock Island Mfg. Co., C. E. Shields, manager, First street and Fifteenth avenue, is planning to erect a $20,000 foundry addition.

SYCAMORE, ILL.—Illinois Wire & Cable Co. is planning to erect a $40,000, 90 x 160-foot, 2-story factory with basement. Bids are being received by Architect A. P. Weber, 40 South LaSalle street, Chicago.

CLINTON, IND.—A. G. Cummings, a representative of the U. S. Powder Co., has options on a site near this city on which a large powder mill will be erected.

LAFAYETTE, IND.—The Lafayette Life Insurance Co. has had plans prepared for a 10-story building 51 x 121 feet to cost $250,000. The Westcott Engineering Co., 111 West Washington street, Chicago, is engineer.

LOGANSPORT, IND.—The Vacuum Ice Machine Co., George Alexander, manager, will build a 1-story plant 55 x 66 feet and 50 feet high, costing $17,000.

PLYMOUTH, IND.—A machine shop will be built by the Ruff Motor Co. for repairing automobiles. The building will be two stories, 50 x 130 feet, and will cost $25,000.

ASHTABULA, O. — W. H. Lucktenberg, general manager, Hotel James, is taking bids on a 1-story, 36 x 40-foot brick machine shop addition, to cost about $75,000 for a company to be organized shortly.

BELLEFONTAINE, O. — The Economy Motor Car Co., which is being organized by local capitalists, has plans for a 2-story, 60 x 200-foot factory.

CANTON, O.—The Knight Mfg. Co. has been organized with $25,000 capital to manufacture machinery by G. F. Knight, C. H. Knight and C. E. Knight.

CANTON, O.—The Canton Auto Parts Co. has recently purchased a site immediately west of the Zahner Metal Sash & Door Co., on which it plans to erect a new factory building.

CINCINNATI.—The Ideal Brass Co. has recently been incorporated for $10,000 by G. C. Whitaker, W. G. Anderson, H. J. Esterman, John A. Hoff and C. B. Terry.

CINCINNATI. — The American Oil Pump & Tank Co. has more than doubled its manufacturing capacity by acquiring a 3-story fireproof building at Findlay street and Dalton avenue, formerly owned by the Freiburg Lumber Co. A 1-story addition will be erected at once and new equipment will be installed. The company makes gasoline pumps and tanks.

CLEVELAND. — The National Screw & Tack Co. has been granted a permit to erect a $57,000, 54 x 140 factory addition.

CLEVELAND. — The Peerless Motor Car Co. plans to erect a dry kiln to contain 5,900 square feet.

CLEVELAND. — The Chandler Motor Co. has filed plans for a conveyor system to be installed in its plant.

CLEVELAND. — The Austin Construction Co. has a contract for the new factory for the Shelby Supply & Mfg. Co., Shelby, O.

CLEVELAND.—The Grabler Mfg. Co. has increased its capital from $300,000 capital to $3,000,000.

CLEVELAND.—The Perfection Trolley Co. has been organized with $10,000 capital by R. W. Winbush, J. W. Brown, William Duncan and others.

CLEVELAND. — The Templar Motor Car Co., care of M. F. Bramley, plans to erect a brick and steel factory building at a cost of $125,000.

CLEVELAND.—Bids will be received until May 8 at 218 City hall by Architect W. H. Betz for structural steel for the new convention hall.

CLEVELAND.—The director of public service will open bids May 4 for 70 tons of lead pipe, specifications may be obtained from the commissioner of water.

CLEVELAND. — The United States engineer will receive sealed proposals for constructing a steel sheet-pile shore connection at East Pier, Lorain Harbor, O., until May 21.

CLEVELAND.—The Federal Gear Co. has purchased property adjoining its plant on East Forty-seventh street and plans to erect a 1-story, 70 x 180-foot addition to be used for the manufacture of automobile parts.

CLEVELAND. — Architect F. C. Warner, Hippodrome annex, took bids about May 1 for a group of six factory buildings for the Toledo Furnace Co. They will cost approximately $150,000.

CLEVELAND.—Architect F. C. Warner, Hippodrome annex, took bids April 23 for an office, shop and welfare building for the Erie Dock Co. The buildings will cost about $50,000.

CLEVELAND. — Architects Christian, Schwartzenberg & Goede, 1900 Euclid avenue, are preparing plans for a 4-story, brick and concrete factory for the Banberger, Reinthaw Company.

CLEVELAND.—The H. E. M. Welding & Machine Co. has been incorporated with a capital of $20,000, by Julius Matousek, Peter Henneges, Hans Egenolf, Robert G. Ingleson and Louis A. Hoppe.

CLEVELAND. — The Belt & Terminal Realty Co., W. R. Hopkins, vice president, Society for Savings building, plans to erect one 1-story and one 2-story factory, 160 x 682 feet, and 140 x 160 feet respectively, at an approximate cost of $600,000. Architects W. S. Ferguson Co., 1900 Euclid building, will receive bids shortly.

COLUMBUS, O.—The Automatic Control Trailer Co. has been organized with $25,000 capital by H. C. Rogers, J. H. Price, S. A. Kinnear and C. W. Seaman.

DAYTON, O.—Engineers Metcalf & Eddy, Boston, have been engaged to supervise improvements to the city water system. The city is planning to purchase 200 tons of water pipe.

ELYRIA, O.—The F. W. Marks Contracting Co. has started to erect a 185 x 200-foot, $50,000 addition to the Elyria Iron & Steel Co.'s plant. The addition will be used to house a cold-rolled strip mill and will require equipment costing $150,000.

FINDLAY, O.—The Independent Torpedo Co. has increased its capital from $100,000 to $300,000.

IRONVILLE, O.—The Taylor Coupler & Steel Castings Co.'s plant has been started and soon will be ready for equipment.

KENT, O.—The Falls Rivet Co. has been granted permission to increase its capital from $200,000 to $250,000.

SPRINGFIELD, O. — The Elwood-Myers Co. has started to erect a 4-story addition to its present plant. Further improvements are planned for the near future.

TOLEDO, O.—Permit has been issued for a $48,000 addition to the machine room of the Libby plant on Buckeye street. D. J. Robinson, the secretary of the company.

URBANA, O. — The Northwestern Ohio Light & Power Co. will erect a substation on a site recently purchased.

WOOSTER, O.—The Central Construction Co., J. S. Perkins, manager, is building two 1-story factory buildings 40 x 80 feet and 30 x 50 feet respectively.

YOUNGSTOWN, O.—The New York Central railroad plans to erect a roundhouse.

YOUNGSTOWN, O. — The Moore-Lamb Construction Co. has been awarded a contract to erect the new St. Edward's school at Tod Lane and Ohio avenue, to cost about $100,000.

ZANESVILLE, O.—The Chemical Fire Extinguishing Co. has increased its capital from $20,000 to $100,000.

DAYTON, KY. — The Wadsworth Watch Case Co. will build a 1-story addition, 66 x 230 feet. H. A. Wadsworth is president.

LOUISVILLE, KY. — The Kentucky Machine & Mfg. Co. has been incorporated by Frank Howe, Curtis Bennett and William Bishop.

LOUISVILLE, KY.—The Kentucky Lithographic Stone Co. will lay a 3-mile spur railroad from its plant at Brandenburg, Ky., and proposes to install an isolated plant and change to electric drive.

MIDDLESBORO, KY.—J. R. Hoe & Sons will build an extension to their machine shop and enlarge the foundry building.

OWENSBORO, KY.—The Franks Tractor-Cultivator Co. is being organized here with a capital of $50,000 to build tractor cultivators and other farm implements. The incorporators are W. L. Franks, who will be president and general manager, James Jones, W. L. Morton and others.

CHARLESTON, W. VA. — The Sunbury Coal Co. has been incorporated with a capital stock of $25,000; by Thomas C. Beury, John A. Thayer, E. H. McNeil, A. S. Guthrie, A. S. Reid, all of Charleston.

CHARLESTON, W. VA.—The Maryland Coal Mining Co. has been incorporated with a capital stock of $200,000; by J. M. Payne, W. D. Payne, Francis Payne, Berkeley Minor Jr., and E. A. McCoy, all of Charleston.

HUNTINGTON, W. VA.—J. S. Farr has awarded the Ferro Concrete Co., Atlanta, Ga., a contract to erect a hotel, to cost $250,000.

HUNTINGTON, W. VA. — The Standard Stamping Co., C. C. Armstrong, Marysville, O., manager, is planning to erect a 1-story factory, 110 x 200 feet, at an approximate cost of $50,000. E. N. Alger, 608 R. & P. building, is the architect.

PARKERSBURG, W. VA. — The Monongahela Valley Traction Co. plans to construct a line to connect Parkersburg and Marietta, O., with Fairmont, W. Va.

Mississippi to the Rockies

DULUTH, MINN.—The Diamond Horseshoe Co. plans to erect an addition to its plant.

MINNEAPOLIS.—The Oldfield Motor Co. is building a 1 and 3-story plant for the manufacture of airplane motors at a cost of $150,000.

ST. CLOUD, MINN.—The Pan Motor Co., Farmers State Bank building, will build an automobile plant. S. C. Pandelfo is president.

TARIBAULT, MINN.—The Nutting Truck Co. is building additions.

FORT MADISON, IA. — The Warmway Paper Mills is building a 2-story mill to cost $30,000.

FORT MADISON, IA.—The Schaeffer Pen Co. has awarded a general contract to the Chicago Construction Co., Chicago, for the remodeling of a 3-story factory and basement, at a cost of $15,000.

KEOKUK, IA.—The Keokuk Electro Metal Co. is building a 1-story addition.

MARSHALLTOWN, IA. — The city of Marshalltown plans to build a water works system. J. J. Wilson is city clerk.

MASON CITY, IA.—Plans are being made to rebuild a 290-foot steel bridge. R. E. Robertson is county engineer.

WEST POINT, IA.—Bonds for $15,000 have been sold to build a water works plant.

JOPLIN, MO.—The M. K. & T. Mining & Smelting Co. plans to build a mill of 500-ton capacity. The company recently was incorporated with $200,000 capital.

KANSAS CITY, MO.—The Kansas City Refrigerator Co. has taken out a Delaware charter with $350,000 capital, incorporators being Jas. A. Fullerton, A. S. Fullerton and F. W. Howden.

KIRKSVILLE, MO.—An election will be held May 4 on issuing $118,000 in bonds for improvements to the water works and electric light plants.

ST. LOUIS.—The Alois Aufrichty Copper & Sheet Metal Works will erect a 2-story, 48 x 50-foot factory. The general contract has been awarded to Kellerman Construction Co., Roe building.

OKLAHOMA, OKLA. — Architects Layton & Smith, 701 Majestic building, are drawing plans for a $75,000 power house for the state of Oklahoma.

TULSA, OKLA. — The Scott Motor Co., newly incorporated, is in the market for machine shop equipment. W. A. Scott is manager.

CALDWELL, KAS. — Bonds for $80,000 have been voted for improvements to the water works and electric light plant. F. O. Kerr is commissioner of public utilities.

DESHLER, NEB.—The Deshler Automobile Spring Wheel Co., recently incorporated with $100,000 capital, will build a factory. W. Nance is president.

BISMARCK, N. D.—The Capital City Iron & Metal Co. has been organized by S. M. Ferris and J. N. Forister, Bismarck and W. R. Turgeson, Garrison, N. D.

BUTTE, MONT.—It is reported that Montana Consolidated Copper Co. shortly will spend about $100,000 for machinery, etc.

GREAT FALLS, MONT.—Great Northern railroad has permits to erect five shops here to cost about $200,000.

HAMILTON, MONT.—The Montana-Utah Sugar Co. will build a plant costing $1,000,000, including a power house.

HELENA, MONT.—James Breen plans to install new mining machinery at his porphyry dike mine including a crushing mill of 100 tons per day capacity.

LEWISTOWN, MONT.—The Great Northern Railroad Co. plans to extend a branch line from Stanford to the iron deposits on Running Wolf mine in Belt mountains.

The Pacific Coast States

SEATTLE.—The Moser Mfg. Co. has been incorporated with $200,000 capital by Milton Moser and Joseph Harrington.

SEATTLE. — The Chicago, Milwaukee & St. Paul railroad is preparing to electrify its line from Othello to Seattle, including eight substations at a total cost of $6,000,000. G. F. Wilder, of Seattle, is western purchasing agent.

SPOKANE.—The Fox Motor Tractor Co. has been organized with $1,000,000 capital by P. C. and F. C. Fox and H. H. DeLong.

SPOKANE.—The C. V. Nordberg Machinery Co., Butte, Mont., will take over the plant of the National Iron Works, and will install equipment to manufacture heavy mining supplies.

TACOMA.—The Eclipse Propeller Co. has been organized with $1,000,000 capital by S. R. Lamont, F. H. Bailey, and C. N. McLean.

LINNTON, ORE.—J. Wilson of the Pacific Coal Steel Co. and N. Pigott of Seattle will establish a plant for the manufacture of steel bolts, bars, and angles.

PORTLAND, ORE.—The Coast Shipbuilding Co., newly organized, will build a plant at once. The company has $400,000 capital. H. E. Pennell is president.

PORTLAND, ORE.—The Columbia Transportation System will build a plant to manufacture all-steel motor boats. The concern has $1,000,000 capital. W. R. Strubble, secretary of the Columbia & Snake River Waterways Association, is interested.

BERKELEY, CAL.—The Globe Mfg. Co. will build a foundry.

MARTINEZ, CAL.—A water works and sewer system to cost $100,000 is planned. Olmsted & Gillelen, Los Angeles, are engineers.

OAKLAND, CAL.—The Doak Gas Engine Co. is building a 2-story addition to cost $14,000.

RICHMOND, CAL. — The Capitol Art Metal Co. has taken over the plant of the Sterling Fixture Co. and will install equipment for the manufacture of metal furniture.

SAN FRANCISCO.—The Magnolia Metal Co. will build a plant to manufacture bearing metals.

SAN FRANCISCO.—The Pacific Steel & Copper Plate Co. is in the market for new equipment.

STOCKTON, CAL. — The Damson Sieve Grip Co. will build an addition to its machine shop and add to its equipment.

New Catalogs

CLUTCH EQUIPMENT.—The Hill Clutch Co., Cleveland, recently issued a four-page bulletin devoted to power transmission and clutch equipment for factories, shops, etc. The complete installation made into the plant of the Cleveland Galvanizing Co., is described and illustrated.

ELECTRIC DRILLS AND GRINDERS.—The Independent Pneumatic Tool Co., Chicago, is distributing a folder illustrating and describing a line of portable drills and electric grinders. This line consists of eight different sizes of electric drills with capacities ranging from ¼ inch to two inches and a portable electric grinder with wheel a ¾ x 4-inch. These tools are equipped with a universal motor for operating on alternating or direct current at 110 or 220 volts. They are equipped with aluminum cylinders and have both ball and roller bearings and specially constructed motors.

HAND TRAVELING CRANES.—A comprehensive booklet, 36 pages in length, describing and illustrating various sizes and styles of overhead hand traveling cranes is being distributed by the Brown Hoisting Machinery Co., Cleveland. Illustrations include not only views of sizes and styles and sectional parts but also a number of installations. The company calls especial attention to the patented truck frame which is a one-piece steel casting on which the I-beam rests. It is supported on two truck wheels with a bearing on each side of the wheel. This construction permits the use of small diameter axles and tends to distribute evenly the wear on the bearings. The bearings with the axles and wheels are secured to the truck-frame by means of U-bolts and are bushed with steel roller bearings. Each crane is also equipped with a squaring shaft connecting one wheel of each truck. Cranes can also be wired for electrically operated trolleys and hoists.

CRANES AND BUCKETS.—Two bulletins were recently issued by the Whiting Foundry Equipment Co., Harvey, Ill., devoted respectively to traveling cranes and to grab buckets. The cranes described in the first bulletin range up to 160 tons capacity. Parts of cranes are individually described and illustrated. Photographs of several installations are also reproduced. The quick detachable grab buckets described in the second bulletin are especially recommended to foundrymen for handling sand, also for handling coal at power stations. One of the particular advantages of this bucket is the simple manner in which it may be adjusted. By reeving the ropes through two or more of the compounding sheaves, as desired, the bucket may be adjusted from work such as gathering loose sand to work of a heavier nature, as handling coal, crushed stone, etc.

WOOD BLOCKS.—A booklet was recently issued by the Ayer & Lord Tie Co., Chicago, manufacturers of wood blocks, describing wood block floors. The text sketches briefly the use of wood and of blocks impregnated with creosote for floor material. Considerable interesting information relative to material and methods is given. Illustrations on colored inserts present views of a number of installations, showing a wide variety of industries to which this type of floor is adapted.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery this year.)

Bessemer valley	$42.00 to 45.00
Bessemer, Pittsburgh	42.95 to 45.95
Basic, Pittsburgh	40.95
Basic, eastern Pa.	40.00 to 41.00
Basic, Buffalo	**39.00 to 40.00**
Malleable, Pittsburgh	42.95
Malleable foundry, Chicago	42.00
Malleable foundry, Philadelphia	43.00 to 44.00
Malleable foundry, Buffalo	**39.00 to 40.00**
No. 1X foundry, Philadelphia	42.50 to 43.50
No. 2 foundry, Pittsburgh	42.95
No. 2 foundry, Cleveland	42.30 to 43.30
No. 2 foundry, Ironton	39.00 to 40.00
No. 2 foundry, Chicago	42.00
No. 2X foundry, Philadelphia	42.00 to 43.00
No. 2X foundry, N. J. tidewater	41.75 to 42.75
No. 2X foundry, Buffalo	**40.00**
No. 2 plain, Philadelphia	41.75 to 42.75
No. 2 plain, N. J. tidewater	41.50 to 42.50
No. 2 plain, Buffalo	**39.00**
No. 2 southern, Birmingham	**38.00**
No. 2 southern, Cincinnati	**40.90**
No. 2 southern, Chicago	**38.00 to 40.00**
No. 2 southern, Phila. delivery	**39.50 to 40.00**
No. 2 southern, Cleveland	39.00 to 40.00
No. 2 south'n, New York docks	39.25 to 40.25
No. 3 southern, Boston docks	39.50 to 40.50
No. 2 south. interior, New Eng.	40.00 to 41.00
No. 2 southern, St. Louis	**38.40 to 40.40**
Virginia, No. 2X, furnace	40.00
Virginia, No. 2X, Philadelphia	42.75
Virginia, No. 2X, Jersey City	43.00
Virginia, No. 2X, Boston points	43.25
Gray forge, eastern Pa.	38.00 to 38.50
Gray forge, Pittsburgh	40.95
Gray forge, Birmingham	37.00
Silveries, 8 per cent, furnace	**46.00 to 48.00**
Silveries, 8 per cent, Chicago	**50.00 to 51.00**
Low phos. Standard, Phila.	76.00 to 78.00
Low phos. Lebanon, Pa., furnace	70.00 to 75.00
Low phos., Pittsburgh	**60.00 to 61.00**
Charcoal, Lake Superior, Chgo.	**49.25 to 51.75**
Charcoal, Buffalo	**49.25 to 51.75**
Charcoal, Birmingham	35.00 to 40.00

IRON ORE

Lake Superior Ores.	Lower Lake Ports.
Old range Bessemer, 55 per cent, ton	**5.95**
Mesabi Bessemer, 55 per cent, ton	**5.70**
Old range non-Bess., 51½ per cent, ton	**5.20**
Mesabi non-Bess., 51½ per cent, ton	**5.05**

Port Henry Ores. Per unit delivered eastern Pa. All non-Bessemer.	
Old Bed, crude, 58 per cent	**10.50c to 11.00c**
Old Bed, concent., 65 per cent	**11.00c to 11.50c**
Harmony concent., 63 per cent	**11.50c to 11.75c**
Lump (at mines)	**$5.75**

COKE

(At the ovens.)

Connellsville furnace	$7.00 to 7.50
Connellsville furnace, contract	**8.00**
Connellsville foundry, contract	**8.50 to 9.00**
Connellsville foundry	**9.50 to 10.00**
Wise county furnace, contract	7.00 to 9.00
Wise county foundry, contract	8.00 to 10.00
Pocahontas furnace, contract	7.00 to 9.00
New River foundry, contract	8.50 to 11.00
New River furnace, contract	7.50 to 10.00

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, delivered prompt	$425 to 450
Ferro manganese, 80 per cent, seaboard and del'd, contract	nominal
Spiegel, 20 per cent furnace remainder of year	75.00 to 80.00
Ferro-silicon, 50 per cent, Pbgh., nominal	225

Bessemer ferro-silicon, 9 per cent, $59.00; 10 per cent, $60; 11 per cent, $62.50; 12 per cent, $65; 13 per cent, $70.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	**$70.00 to 80.00**
Forging billets, Philadelphia	**100.00**
Forging billets, Pbgh., nominal	**100 to 115**
Forging billets, Chicago	**100.00**
Wire rods, Pittsburgh	85.00 to 90.00
Bessemer billets, Youngstown	**75.00 to 80.00**
Bessemer bilets, Pittsburgh	**75.00 to 80.00**
Open hearth billets, Pittsburgh	**75.00 to 80.00**
Open hearth billets, Youngstown	**75.00 to 80.00**
Bess. sheet bars, Youngstown	80.00 to 82.50
Op. h'th sheet bars, Youngstown	80.00 to 85.00
Bess. sheet bars, Pittsburgh	80.00 to 82.50
Open hearth sheet bars, Pbgh.	80.00 to 85.00
Muck bars, Pittsburgh	**60.00**
Grooved steel skelp	4.00c
Sheared steel skelp	**4.50c**

RAILS AND TRACK MATERIAL

(Gross tons.)

Angle bars, st. sect., Pbgh., base	**2.75c to 3.25c**
Angle bars, st. sections, Chgo.	**2.75c to 3.00c**
Standard bessemer rails, mill	$38.00
Standard open hearth rails, mill	40.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	**$0.95**
Newark, N. J.	**2.98**
Boston	**3.18**
Philadelphia	**2.78**
Pittsburgh	**.95**
St. Louis	**3.18**
Minneapolis, St. Paul	**4.54**
Buffalo to:—	
Albany, N. Y.	**$1.26**
New England (all rail)	**2.58**
New York and Brooklyn (all rail)	**2.58**
New York and Brooklyn (by canal)	**1.25 to 1.60**
Virginia furnaces to:—	
Boston docks (r. and w.)	**$3.05**
New England (all rail)	**3.25**
New York dock (r. and w.)	**2.88**
Birmingham, Ala., to:—	
Cincinnati	**$2.90**
Chicago	**4.00**
Cleveland	**4.00**
Louisville, Ky.	**2.65**
Minneapolis, St. Paul	**5.85**
New York (all rail)	**6.15**
New York (r. and w.)	**4.25**
Philadelphia (all rail)	**5.20**
Philadelphia (r. and w.)	**4.00**
Pittsburgh	**4.90**
Savannah, Ga.	**2.75**
St. Louis	3.40
Chicago to:—	
Des Moines	**$2.80**
Milwaukee	**.50**
Minneapolis, St. Paul	**2.00**
Moline, Ill.	**1.40**
Omaha	**3.58**
St. Louis	**1.58**
Ironton and Jackson, O., to:—	
Chicago	**$2.54**
Cincinnati	**1.26**
Cleveland	**1.62**
Detroit	**1.81**
Indianapolis	**1.58**
Minneapolis, St. Paul	**4.54**
Duluth, Minn., to:—	
Minneapolis-St. Paul	**$1.25**
Mayville, Wis:—	
Minneapolis-St. Paul	**$1.75**

Light rails, 8 to 10 lbs., Pbgh.	63.00
Light rails, 8 lbs., Chicago	63.00
Light rails, 12 to 14 lbs., Pbgh.	62.00
Light rails, 12 lbs., Chicago	62.00
Light rails, 16 to 20 lbs., Pbgh.	61.00
Light rails, 16 to 20 lbs., Chgo.	61.00
Light rails, 25 to 45 lbs., Pbgh.	60.00
Light rails, 25 to 45 lbs., Chgo.	60.00
Relaying rails, standard, mill	**$38.00 to 40.00**
Relaying rails light, Chicago	**40.00**
Relaying rails, light, St. Louis	48.00 to 51.00
Spikes, railroad, Pittsburgh	**3.65c**
Spikes, railroad, Chicago	4.00c
Track bolts, Pittsburgh	5.50c to 8.00c
Track bolts, Chicago	5.00c
Tie plates, Chicago	**$60.00 to 65.00**

SHAPES, PLATES AND BARS

Structural shapes, con. Pbgh.	**4.00c**
Structural shapes, Philadelphia	**3.75c to 4.40c**
Structural shapes, New York	**3.76c to 4.41c**
Structural shapes, Chicago	4.19c to 5.00c
Tank plates, Chicago	4.69c to 7.00c
Tank plates, Pittsburgh (con.)	**4.50c to 4.75c**
Tank plates, Pittsburgh	**5.00c to 5.50c**
Tank plates, Philadelphia	4.65c to 7.15c
Tank plates, New York	4.66c to 7.16c
Bars, soft steel, Chicago	3.69c to 4.00c
Bars, soft steel, con. Pbgh.	**3.50c**
Bars, soft steel, New York	3.669c to 3.919c
Bars, soft steel, Philadelphia	3.509c to 3.909c
Hoops, Pittsburgh	**4.25c to 4.50c**
Bands, Pittsburgh	**4.10c to 4.35c**
Bands, Pittsburgh (contr.)	3.50c to 4.00c
Shafting, Pbgh. contr. carloads	**10 to 5 off**
Bar iron, Chicago	3.25c to 3.50c
Bar iron, Philadelphia	**3.659c**
Bar iron, Cleveland	3.50c
Bar iron, New York	**3.669c**
Bar iron, Pittsburgh	3.75c
Hard steel bars, Chicago	3.50c
Cut nails, Pittsburgh	3.70c

SHEETS

(In cents per pound.)

(Open hearth material takes 25c above prices of bessemer.)

SHEET MILL BLACK.

Gage.	Bessemer.
17 to 21	6.30 to 7.30
22 to 24	6.35 to 7.35
25 and 26	6.40 to 7.40
27	6.45 to 7.45
28	6.50 to 7.50
29	6.55 to 7.55
30	6.65 to 7.65

TIN MILL BLACK.

Gage.	Bessemer.
15 and 16	6.20 to 7.20
17 to 21	6.35 to 7.35
22 to 24	6.40 to 7.40
25 to 27	6.45 to 7.45
28	6.50 to 7.50
29	6.55 to 7.55
30	6.60 to 7.60

GALVANIZED.

Gage.	Bessemer.
10 and 11	7.50 to 8.50
12 to 14	7.60 to 8.60
15 and 16	7.75 to 8.75
17 to 21	7.90 to 8.90
22 to 24	8.05 to 9.05
25 and 26	8.20 to 9.20
27	8.35 to 9.35
28	8.50 to 9.50
29	8.75 to 9.75
30	9.00 to 10.00

BLUE ANNEALED.

Gage.	Bessemer.
3 to 8	6.50 to 7.50
9 to 10	6.50 to 7.50
11 to 12	6.50 to 7.50
13 and 14	6.50 to 7.50
15 and 16	6.50 to 7.50

No. 28 black, Chicago	6.69c
No. 28 galvanized, Chicago	**7.69c to 8.19c**
No. 10 blue annealed, Phila.	6.659c
No. 10 blue annealed, Chicago	6.19c

TIN PLATE

Tin plate, 100 lb., coke base, contract	**7.50c to 10.50c**
Tin plate, coke base, prompt	**8.50c to 11.50c**
Terne plate, I. C.	7.15c to 8.00c
Terne plate long	8.00c

IRON AND STEEL PIPE

(Price adopted May 1, 1917.)

Steel.

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
⅛, ¼ and ⅜, butt	42	15½
½, butt	46	31½
¾ to 3, butt	49	35½
2, lap	42	29½
2½ to 6, lap	45	32½
7 to 12, lap	42	28½
13 and 14, lap	32½	....
15, lap	30	....

Iron.

(Prices adopted May 1, 1917.)

Standard weight, threads and couplings, diam. in inches.	Black. Per cent off.	Galv. Per cent off.
⅛ and ¼, butt	30	3
⅜, butt	31	4
½, butt	35	17
¾ to 1½, butt	38	22
1¼, lap	23	8
1½, lap	30	16
2, lap	31	17
2½ to 6, lap	32	20
7 to 12, lap	31	19

BOILER TUBES

(Price adopted April 2, 1917.)

Steel, 3½ to 4½ inches, l. c. l.	**34**
Iron, 3½ to 4½ inches, l. c. l.	**34**

IRON AND STEEL PRICES

Corrected up to Tuesday noon

WIRE PRODUCTS

(Retailers' prices 5 cents above jobbers' quotations).

Wire nails, jobbers', Pittsburgh	$3.50
Coated nails	3.40
Plain wire jobbers', Pittsburgh	3.45
Galvanized wire, jobbers', Pbgh.	4.15
Polished staples, Pbgh	3.65
Galvanized staples, Pbgh	4.35
Barb wire, painted jobbers', Pbgh.	3.65
Barb wire, galv., jobbers', Pbgh.	4.35

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts ⅜ x 6 inches, smaller or shorter, rolled thread, 40; cut threads, 35 and 2½, larger or longer, 25.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 40 and 10; cut, 40; larger or longer, 30.

Cold pressed, semi-finished hexagon nuts, 50 and 10.

Gimlet and cone point lag bolts, 45. Hot pressed square nuts, blanks, $2.10 off; tapped $1.90 off. Hot pressed hexagon nuts, blank, $1.60 off; tapped, $1.40 off.

Cold pressed square nuts, blank, $1.70 off; tapped, $1.50 off. Cold pressed hexagon nut, blank, $1.60 off; tapped, $1.40 off.

RIVETS

Structural rivets, Pittsburgh	4.75c
Boiler rivets, Pittsburgh	4.85c

Tinner's rivets, 40 and 10 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh).

Base sizes	3.50c to 4.00c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	7.00c

COLD ROLLED STRIP STEEL

Base price, 7.00c to 8.00c per 100 pounds, hard, coils 1½ inches and wider and .100 inch and heavier.

CAST IRON WATER PIPE

Four-inch, Chicago	$58.50
Six-inch and larger, Chicago	55.50
Six-inch Class B, New York	55.50
Four-inch class B, New York	58.50
Four to six-inch, Birmingham	**48.00 to 50.00**
Six-inch and larger, Birmingham	**44.00 to 46.00**

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	4.50c
Steel bars, Cleveland	4.50c
Steel bars, Detroit	4.25c
Steel bars, Philadelphia	4.50c
Steel bars, New York	**4.50c**
Steel bars, St. Louis	4.55c
Steel bars, Cincinnati	4.65c
Steel bars, St. Paul	4.60c
Steel bars, over 2-in., Buffalo	**4.50c**
Steel bars, Buffalo	**4.40c**
Iron bars, Chicago	4.50c
Iron bars, Cleveland	4.50c
Iron bars, Detroit	**4.00c**
Iron bars, St. Louis	4.55c
Iron bars, Cincinnati	4.65c
Iron bars, Philadelphia	4.25c
Iron bars, New York	**4.00c to 4.25c**
Shapes, Chicago	5.00c
Shapes, Detroit	4.50c
Shapes, St. Louis	5.05c
Shapes, St. Paul	5.10c
Shapes, New York	**4.75c**
Shapes, Cleveland	5.00c
Shapes, Philadelphia	4.50c
Shapes, Buffalo	**4.60c**
Shapes, Cincinnati	5.00c
Plates, Chicago	6.50c
Plates, Detroit	**5.50c**
Plates, St. Louis	6.55c
Plates, St. Paul	6.60c
Plates, New York	**6.50c to 7.00c**
Plates, Cleveland	6.50c to 7.00c
Plates, Philadelphia	6.50c
Plates, Cincinnati	7.00c
No. 10 blue anl. sheets, Chicago	6.50c
No. 10 blue anl. sheets, Clevel'd	7.00c
No. 10 blue anl. sheets, Buffalo	4.50c
No. 10 blue anl. sheets, St. L.	6.55c
No. 10 blue anl. sheets, Cincin.	7.00c
No. 10 blue anl. sheets, St. Paul	6.75c
No. 10 blue anl. sheets, Detroit	5.75c
No. 28 black sheets, Chicago	7.25c
No. 28 black sheets, Cleveland	7.75c
No. 28 black sheets, Cincinnati	7.00c
No. 28 black sheets Detroit	5.90c
No. 28 black sheets, St. Louis	7.30c
No. 28 black sheets, St. Paul	7.50c
No. 28 galv. sheets, Chicago	9.00c
No. 28 galv. sheets, Cleveland	9.00c
No. 28 galv. sheets, Cincinnati	8.50c
No. 28 galv. sheets, Detroit	8.00c
No. 28 galv. sheets, St. Louis	**8.85c**
Hoops, Cleveland	**5.50c**
Hoops, Detroit	**4.75c**

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	**$18.50 to 19.00**
Bundled sheets, Cleveland	**18.00 to 18.50**
Bundled sheets, Buffalo	15.50 to 16.00
Frogs, switches, guards, St. L.	27.50 to 28.00
Heavy melting steel, Pittsburgh	**28.50 to 29.50**
Heavy melting steel, Buffalo	25.00 to 26.00
Heavy melting steel, Chicago	27.00 to 27.50
Heavy melting steel, Cleveland	27.50 to 28.00
Heavy melting steel, Cincinnati	**24.50 to 25.50**
Heavy melting steel, eastern Pa.	**24.50 to 25.50**
Heavy melting steel, New York	**23.00 to 23.50**
Heavy melting steel, St. L.	28.00 to 29.00
Heavy melt'g steel, Birmingham	20.00 to 20.50
Hydraulic pressed sheets, Cleve.	21.00 to 21.50
Hydraulic pressed sheets, Pitts.	21.00 to 22.00
Hydraulic pressed sheets, Chgo.	20.00 to 20.50
Low phos. steel, Buffalo	**33.00 to 36.00**
Low phos. steel, Pittsburgh	36.00 to 37.00
Low phos. steel, eastern Pa.	**36.00 to 38.00**
Shoveling steel, Chgo.	25.00 to 25.50
Shoveling steel, St. Louis	23.00 to 24.00
Steel rails, short, Chicago	31.50 to 32.00
Steel rails, short, Cleveland	**32.00 to 32.50**

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.0 cents

Steel rails, short, St. Louis	$29.50 to 30.00
Steel rails, old, Birmingham	**22.00 to 23.00**
Stove plate, Chicago	14.00 to 14.50
Stove plate, Cleveland	**16.00 to 16.50**
Stove plate, Cincinnati	**13.50 to 14.50**
Stove plate, St. Louis	14.00 to 14.50
Stove plate, N. J. points	**16.00 to 16.50**
Stove plate, Birmingham	**13.00 to 14.00**
Stove plate, Buffalo	16.50 to 17.00
Stove plate, eastern Pa.	18.50 to 19.00
Stove plate, Pittsburgh	16.00 to 17.00

(Net Tons)

Boiler plate, cut, No. 1, Chicago	**18.00 to 18.50**
Boiler plate, cut, No. 1, St. L.	16.00 to 16.50
Bundled sheet, Cincinnati	**15.25 to 15.75**
Knuckles, coup., Chicago	**30.50 to 31.00**
Knuckles, coup., St. Louis	27.50 to 28.00
Springs, Chicago	**30.75 to 31.25**

IRON MILL USE

(Gross Tons)

Busheling No. 1, Buffalo	21.50 to 22.00
Busheling, No. 2, Buffalo	14.00 to 14.50
Busheling, No. 1, Pittsburgh	20.00 to 21.00
Cast borings, New York	**13.50 to 13.75**
Cast borings, eastern Pa.	15.50 to 16.50
Cast borings, Buffalo	13.00 to 13.50
Cash borings, Pittsburgh	15.00 to 15.25
City wrought, New York	**26.00 to 26.50**
Cut forge, Chicago	27.00 to 27.50
Forge flash'gs, un. 10 in., Cleve.	**25.00 to 26.00**
Forge flash'gs, ov. 10 in., Cleve.	**22.00 to 23.00**
Forge, No. 1, eastern Pa.	**18.50 to 19.00**
Grate bars, Buffalo	16.50 to 17.00
Grate bars, N. J. points	**16.00 to 16.50**
Iron axles, Pittsburgh	**49.00 to 50.00**
Iron axles, Cincinnati	**44.00 to 45.00**
Iron axles, eastern Pa.	**38.00 to 40.00**
Iron axles, Chicago (net tons)	42.50 to 43.00
Iron axles, Buffalo	**45.00**
Iron rails, Chicago	32.00 to 32.50
Iron rails, Buffalo	26.00 to 26.50
Iron rails, Cincinnati	**28.00 to 29.00**
Iron rails, St. Louis	30.50 to 31.50
Iron rails, Cleveland	**32.00 to 33.00**
Machine shop turnings, Buffalo	**11.50 to 12.00**
Mch. shop turnings, New York	**12.00 to 12.50**
Mach. shop turnings, Pittsburgh	**14.00 to 14.25**
Mch. shop turnings, eastern Pa.	**14.50 to 15.00**
Mch. shop turnings, Birmingham	8.50 to 9.50
R. R. and mch. cast, No. 1, Bfl.	24.00 to 24.50
R. R. wrought, No. 1, Buffalo	29.00 to 30.00
R. R. wrgt., No. 1, eastern Pa.	39.00 to 41.00
R. R. wrought, No. 1, Pittsburgh	30.00 to 31.00
R. R. wrought, No. 1, B'ham	25.00 to 25.50
Wrought pipe, Buffalo	19.50 to 20.50
Wrought pipe, eastern Pa.	**21.50 to 22.50**
Wrought pipe, New York	**18.50 to 19.00**

(Net Tons)

Angle bars, iron, Chicago	$33.50 to 34.00
Angle bars, steel, St. Louis	25.50 to 26.00
Arch bars and transoms, St. L.	33.00 to 34.00
Arch bars and transoms, Chgo.	**35.00 to 36.00**
Busheling, No. 1, Chicago	19.50 to 20.00
Busheling, No. 1, Cincinnati	**16.50 to 17.00**
Busheling, No. 1, Cleveland	**21.00 to 21.50**
Busheling, No. 1, St. Louis	19.00 to 19.50
Busheling, No. 2, Chicago	14.00 to 14.50
Cast borings, Cincinnati	**10.00 to 10.50**
Cast borings, Cleveland	**12.00 to 12.25**
Cast borings, St. Louis	10.50 to 11.00
Cast borings, Chicago	10.75 to 11.25
Grate bars, Cleveland	16.00 to 16.50
Iron axles, St. Louis	38.00 to 39.00
Iron axles, Cleveland	**45.00 to 46.00**
Machine shop turnings, Chicago	**11.00 to 11.50**
Mach. shop turnings, Cleveland	**11.00 to 11.25**
Machine shop turn'gs, Cincinnati	**10.00 to 10.50**
Mach. shop turnings, St. Louis	11.50 to 12.00
Pipes and flues, Cleveland	19.00 to 20.00
Pipes and flues, Chicago	17.50 to 18.00
Pipes and flues, St. Louis	18.00 to 18.50
Railroad wrought, No. 1, Cleve.	**30.00 to 31.00**
Railroad wrought, No. 1, Chgo.	30.00 to 30.50
Railroad wrought, No. 1, Cinci.	**23.00 to 24.00**
Railroad wrought, No. 1, St. L.	30.50 to 31.00
Railroad wrought, No. 2, Chgo.	27.50 to 28.00
Railroad wrought, No. 2, St. L.	28.50 to 29.00

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$17.50 to 18.00
Axle turnings, Buffalo	18.00 to 18.50
Shafting, New York	**28.50 to 29.00**
Shafting, eastern Pa.	34.00 to 35.00
Steel car axles Birmingham	**35.00 to 36.00**
Steel car axles, New York	**42.00 to 43.00**
Steel car axles, Buffalo	**45.00**
Steel car axles, Cleveland	44.00 to 45.00
Steel car axles, Pittsburgh	49.00 to 50.00
Steel car axles, eastern Pa.	**41.00 to 43.00**

(Net Tons)

Shafting, St. Louis	27.00 to 27.50
Steel car axles, St. Louis	39.00 to 40.00
Steel car axles, Chicago	43.00 to 44.00

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pittsburgh	**24.00 to 25.00**
Car wheels, (steel), Pittsburgh	29.00 to 30.00
Car wheels, Chicago	24.50 to 25.00
Car wheels, eastern Pa.	**27.00 to 28.00**
Car wheels, Buffalo	24.00 to 24.50
Car wheels, New York	21.50 to 22.50
Car wheels, St. Louis	23.50 to 24.00
Car wheels, Birmingham	**18.00 to 19.00**
Car wheels, Cleveland	23.00 to 24.00
Cast, No. 1, N. J. points	24.50 to 25.00
Cast, No. 1, eastern Pa.	**29.00 to 30.00**
Cast, No. 1, Pittsburgh	**23.50 to 24.00**
Cast, No. 1, Birmingham	21.00 to 21.50
Malleable railroad, Cincinnati	16.00 to 16.50
Malleable railroad, Cleveland	24.00 to 25.00
Malleable railroad, Buffalo	24.00 to 24.50
Malleable railroad, Pittsburgh	22.00 to 22.50
Malleable railroad, eastern Pa.	21.00 to 22.00
Tram car wheels, Birmingham	20.00 to 20.50

(Net Tons)

Cast, No. 1, Chicago	21.50 to 22.00
Cast, No. 1, Cincinnati	21.25 to 21.75
Cast, No. 1, St. Louis	21.50 to 22.00
Malleable railroad, Chicago	22.50 to 23.00
Malleable railroad, St. Louis	20.50 to 21.00
Malleable agricultural, Chicago	19.00 to 19.50
Malleable agricultural, St. Louis	17.50 to 18.00

MISCELLANEOUS USES

(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	32.00 to 35.00
Reroll. rails, 5 ft. & ov., Chgo.	35.00 to 36.00
Reroll. rails, 5 ft. & ov., E. Pa.	**32.00 to 33.00**
Reroll. rails, 5 ft. & ov., St. L.	33.50 to 34.00
Reroll. rails, 5 ft. or ov., Cleve.	33.00 to 34.00
Reroll. rails, 5 ft. or ov., Birm.	30.00 to 31.00

(Net Tons)

Boiler punchings, Chicago	24.50 to 25.00
Locomotive tires, Chicago	39.50 to 40.00
Locomotive tires, St. Louis	37.00 to 39.00

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United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM (Solder).
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM (Vanadium).
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM INGOTS.
Pittsburgh Aluminum Co., Pittsburgh, Pa.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS (Sheet).
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS (See Steel, Structural).

ANNEALERS (Pot and Muffle).
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

ANNEALING BOXES AND POTS.
Blackwood Steel Fdy. Co., The, Springfield, O.
Garwood Bronze & Iron Works, Garwood, N. J.
Knox Pressed & Welded Steel Co., Pittsburgh.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ANODES (Nickel).
Williams & Co., Inc., Pittsburgh, Pa.

ANTI-SLIP TREADS FOR STAIRS.
Pittsburgh Iron & Steel Foundries Co., Pittsburgh, Pa.

ARCHITECTURAL SHAPES.
Empire Art Metal Co., College Pt., N. Y.

ARMATURES.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AUTO TOWING CABLES.
American Steel & Wire Co., Chicago, Ill.

AUTO TRUCKS.
Federal Motor Truck Co., Detroit, Mich.

AXLES.
American Bridge Co., New York City.
American Steel Export Co., New York City.
Bay City Forge Co., Erie, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Co., Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

AXLE LATHES.
Bridgeford Mch. Tool Wks., Rochester, N. Y.

BABBITT METAL.
Keystone Bronze Co., Pittsburgh, Pa.
Lubricating Metal Co., The, New York City.
Ryerson, Jos., T., & Son, Chicago, Ill.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.

BAKERS (Wire Coating and Bluing).
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALE TIES.
American Steel & Wire Co., Chicago, Ill.

BALLS (Brass and Bronze).
Auburn Ball Bearing Co., Rochester, N. Y.

BALLS (Monel Metal).
Williams & Co., Inc., Pittsburgh, Pa.

BALLS (Steel).
Auburn Ball Bearing Co., Rochester, N. Y.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDERS (Hydraulic for Projectiles).
Southwark Foundry & Mch. Co., Philadelphia.
West Tire Setter Co., The, Rochester, N. Y.

BAND (Steel).
Akron-Selle Co., The, Akron, O.
Carnegie Steel Co., Pittsburgh, Pa.
Interstate Iron & Steel Co., Chicago, Ill.

BARBED WIRE FENCE (Equipment).
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARGES (Steel).
American Bridge Co., New York City.

BARS (Concrete Reinforcing).
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS (Iron and Steel).
American Bridge Co., New York, N. Y.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bingham, W., Co., The, Cleveland, O.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Company, Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R., Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Alloys Steel Corp., The, Canton, O.
Upson Nut Co., Cleveland, O.
Westerman & Co., Lockport, N. Y.

BARS (Tin).
Andrews Steel Co., Newport, Ky.

BEAMS, CHANNELS AND ANGLES.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Empire Art Metal Co., College Pt., N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS (Ball).
Auburn Ball Bearing Co., Rochester, N. Y.
New Departure Mfg. Co., Bristol, Conn.

BEARINGS (Ball Thrust).
Auburn Ball Bearing Co., Rochester, N. Y.

BEARINGS (Vanadium Steel).
American Vanadium Co., The, Pittsburgh, Pa.

BELT CEMENT AND DRESSING.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.

BELT LACING (Leather).
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.

BELTING (Chain).
Link-Belt Company, Chicago, Ill.

BELTING (Leather).
Bingham, W., Co., The, Cleveland, O.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.

BENCHES (Steel).
New Britain Mach. Co., New Britain, Conn.

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